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*Wurts Brothers*

*An archway entrance to the inner court of the Amalgamated Housing Corporation project, the Bronx, N. Y. Springsteen & Goldhammer, architects*

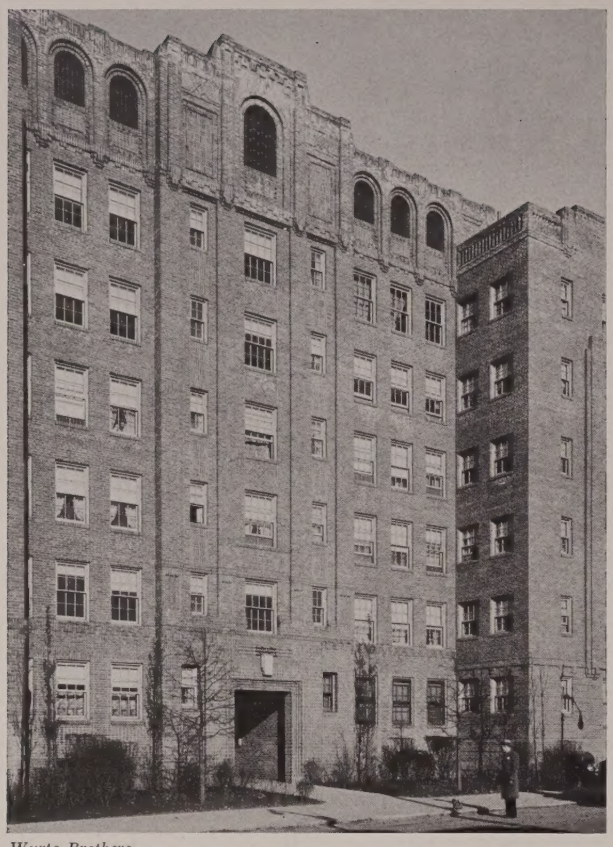
# A Designer's Notes on Low-cost Multi-family Housing

## *By Thomas C. Stapleton*

IT is only within recent years that large-scale housing has received the attention of prominent architects, who have since become specialists in this field. As the fundamental purpose of this type of work is to bring to the mass of people living conditions of a higher order, encompassing greater social and recreational advantages at the lowest possible cost, the problem of design has become increasingly more important. Tenants are no longer satisfied with just a place to live, but have come to appreciate, respect, and in many cases demand, carefully planned and well-designed houses.

With the increasing demands to reduce rental cost per room, and at the same time accomplish the aforesaid results, there are few problems in the architectural profession which present such limitations to the designer as multi-family housing operations. Fortunately, economy of space and materials has in many cases forced the hand of the designer to a result of simplicity.

During the experience of my participation as



*Wurts Brothers*

*Phipps Garden Apartments, Sunnyside, Long Island. Clarence S. Stein, architect*

designer and co-designer of some of the largest housing developments in this country, certain fundamentals were discovered. These were used as a working basis. The preservation at all times of domestic character was strictly adhered to, and it has been quite apparent that without this "domestic feeling" the building, or group of buildings, could easily acquire an institutional or factory-like appearance.

As the low-cost projects prohibit the use of customary cornices, sloping roofs, and many other details familiar to the layman and associated with domestic architecture, it has been found necessary to concentrate upon mass, proportion, and fenestration.

With the development of planning, the area occupied by the buildings has become smaller, and the feature of gardens was introduced. I believe that this feature will become one of the designer's greatest assets. It provides a great deal of domestic atmosphere and is a practical source of enjoyment to the tenants. The heretofore more desirable street apartments are losing their popularity to the apartments which face the garden.

In the large-size developments it has been found fitting to incorporate a children's playground with all its accessories. These playgrounds, generally speaking, are not particularly attractive to look at, and should be well screened where possible with adequate planting. Usually adjoining the playground, in the building, it is quite necessary to have a well-equipped nursery. At a very small added expense, this nursery may be attractively painted with juvenile decorations.

The auditorium has been found a valuable asset for the purpose of entertainments, weddings, and other social gatherings. A maple floor, sand-finished walls and ceilings, painted and glazed, specially designed lighting fixtures, a stage or platform, a supply of collapsible seats, a small kitchen, fully equipped, and a cloak room with lavatory adjoining, comprise the necessary arrangements.

In studying the wall surfaces, the single window devoid of mullions, with well-designed proportions, is found most fitting. The concentration of ornament to points that are easily observed, such as around doorways in the form of stone carving, brick design, or perhaps decorative metal work; or to points of accent in the upper portion of the building, is both economical and in good taste, and I have learned that the employment of the very best craftsmen available has been entirely justified for this work. In my opinion, a well-designed, beautifully executed lantern, or a fine piece of stone carving by a master craftsman, in the correct location, has the tendency to add quality and richness to the simplest of surrounding building materials.

As it is most economical to use brick in the construction of this type of work, I have spent much time in experimenting with both the color and the texture of this material. In our closely populated cities, where dust and smoke have to be taken into consideration, the brick that will withstand these ravages and still maintain its appearance should be chosen.

On some of the largest housing developments, brick was imported from Europe. This brick had both the desired texture and color, and a great deal of domestic character. However, the imported brick presented many difficulties. One might choose a very satisfactory sample, but, owing to the fact that the European brick factories are generally owned by individuals and run on a small scale, the brick is collected and delivered to a central shipping point.

Each manufacturer having a slight variation in his product, this of course becomes obvious when the brick is laid in a large building operation, and the approved sample is found to be misleading.

These conditions prompted me to comb the American market for a brick that would have the texture and color of the foreign brick. It was also necessary to be assured of uniformity. After spending considerable time and receiving splendid co-operation, brick was developed which seemed to meet all the requirements. During the process of manufacture, the face and edges were made irregular. The brick contained colors of golden browns, oranges, yellows, and a delicate rose. These colors in a solid wall form a perfect complementary to the natural greens of the garden shrubbery.

An effective method of bricklaying is to use a course of headers and a course of stretchers, alternating the joints of the stretchers (see photograph on page 5.) This produces a diamond pattern with the brick joints and has been used almost exclusively by the writer. The mortar joint is approximately ½" thick, depending upon the size of the brick, as the dimension of 2¾" for one brick and one joint works out well for structural purposes. If a brick 2" can be procured, leaving a ¾" joint, this condition would be preferable.

It is a good idea to color the mortar, either by the use of coarse yellow sand or dry pigment with the cement.

The arcade, which has been successfully incorporated in so many of the modern housing developments, provides an interesting place in which to use this same brick. Whether the ceiling be flat-arched with concrete beams, or vaulted with stucco, the effect of the brickwork has a tendency to tie the whole together. In many instances stone trim has been eliminated from the minor doorways and a satisfactory effect gained by the use of brick design with either rough-edged slate or tile laid with the edges showing.

Departure from the flat roof is not advisable, as the introduction of pitched roofs of any kind increases the cost without any material benefit; in cases where roof effects have been added, they will be found artificial and not in the cause of good design. Low-pitched roof effects are never advisable, owing to the excessive cost of construction and the difficulty of making them weather-tight. However, such effects as may be gained by the use of pitched roofs on stair and elevator bulkheads and penthouse enclosures are quite favorable.

It is especially recommended to apply individual designs to the large boiler flues and other chimneys.

At present the most economical and practical window for use in low-cost multi-family housing is the double-hung wood window with wood frame. From the design point of view, in some cases it would be desirable to use the steel casement window, but at the present time, the manufacturers have not been able to produce a window in competition with the wood double-hung window that is practical; the low-priced steel sash is of very light construction and, with the demands made upon it by multi-family housing use, it cannot be maintained weather-proof. There is also the difficulty of getting good installation with this low-priced sash, as it is found after the work has been completed that many frames have been twisted and are almost impossible to straighten. When these difficulties can be overcome, there is no doubt about the advisability of using the casement

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*The studied handling of fire escapes, Phipps Garden Apartments, Sunnyside, Long Island. Clarence S. Stein, architect*

sash, and to be practical it should have ventilation by transom at either the top or bottom.

It is not advisable to use a double-hung window in excess of 4′ 6″ wide. Double-thick American glass is recommended at all times. Careful study should be made of the proportion of the individual lights of glass in relation to the window opening. This proportion should be maintained throughout the entire operation regardless of the size of windows.

Owing to the simplicity in the general design of the multi-family housing, brick window-sills are more harmonious with the general character of the building than stone or terra-cotta sills, and if properly laid, with ¾″ pitch and ½″ overhang, are just as practical.

Careful study should be made of the exterior painting of window frames and sash. The general tone of the building surface should be carried into the windows, to avoid the effect of burned-out holes when viewed from a distance. A harmony color, two or three shades lighter than the brick, will accomplish this result.

As it is necessary to add a coping to the brick walls of these flat-roofed buildings, ordinary rough-edged roofing slate supplies a free line of drawing at the top of the building which is not obtainable with the customary use of stone or terra-cotta coping. This slate should be in thicknesses of ¾″, the width to conform with the brick wall, allowing for a slight overhang front and back, length approximately 20″ to 36″, laid in a bed of ½″ mortar, with slightly raked-out joint. For the complete thickness of this coping for from one to three stories of building height, it is advisable to use three thicknesses of slate and three beds of mortar, with a total dimension of approximately 4″. On buildings above three stories in height, an additional layer of slate and mortar may well be added, giving an approximate thickness of 5″.

George H. Van Anda

*The decorative possibilities in chimneys, Van Tassel Apartments, North Tarrytown, N. Y. Andrew J. Thomas, architect*

Where it is found necessary to have fire-escapes, and the cost of special designs is prohibitive, the rule of painting them the same color as the brickwork will tone them down considerably.

The use of directory boards is necessary to the housing development using the street arcade and garden entrances. This directory board lists the tenants in the various buildings, and usually designates the building in which each apartment is located; it is very conspicuous and should have the special attention of the designer.

One of the most satisfactory types of numerals or lettering to be used as a designation of the entrances is a bronze concave letter, filled with a cream-colored porcelain. This letter is easily visible at all times and requires no care.

The name and push-button plates made of half-polished wrought iron, in large quantities cost but little more than the customary brightly polished brass, and contribute to the general effect.

Where the use of garden walls is needed to join buildings in one development, the same type of brickwork as that of the building is employed, with a simple coping of either tile or slate. A sturdy, well-designed oak gate is much more attractive than the usual iron one.

Inside the building, two very practical materials for the stair-hall side walls are the so-called "tapestry brick," and stucco effect, either one resisting the children's pencils. The stair-hall floor and base of oiled bluestone, variegated slate, or harmonious quarry tile, is attractive and easily cared for.

Owing to the economy in space of entrance

vestibules and stair-halls in this type of planning, it has been found advisable to eliminate lighting fixtures that hang from the ceiling. A simple close-to-the-ceiling fixture has a better appearance and is much more practical.

A more desirable effect is gained by painting the iron soffits, strings, and balusters of the stairs a cheerful color, harmonious with the walls, rather than the conventional dark green or gray. The handrail and newelpost caps, for practical reasons can be painted the same color in a rich dark tone. For the stair treads, inch-thick slate is good.

As to heating, cast-iron radiation at the present time continues to be less expensive than other forms. Fireplaces are entirely out of the question in low-cost multi-family housing.

Kalamein doors of the apartment entrances, painted one or two shades lighter than the side walls, seem to dispel the gloom of a dark door or the artificiality of a grained one.

Single-panel gumwood doors, painted one or two shades darker than the wall color (trim to match), are preferable to staining, as the natural color of the wood is not uniform and a very dark stain is necessary to tie the whole together. With the general preference for light-colored walls, the dark stained door has a tendency to create the effect of voids in the wall surface.

A saving may be made by omitting the trim around windows, but not around the doors. The width of trim depends upon the size and scale of the rooms in the development—3″ is a good standard in this type of work.

For interior painting, a good three-coat job of the usual specification is provided, with flat paint on all rooms with the exception of the kitchen and bathroom, which receive a flat enamel. Long experience has shown that there is absolutely no economy in cheap paint. The writer has had the experience of selecting interesting colors for the various rooms only to find after a period of about three weeks that the colors had changed completely. This has been directly traced to the quality of paint. The general procedure in selecting colors for an apartment depends primarily upon its location, and the quality of light which it receives. An apartment which faces the north should receive a generous amount of the warm and lighter colors. The grays and grayed colors should be avoided. As most apartments in the new type of multi-family garden plan receive more than one kind of light, or one portion of the apartment faces north and the other east, west, or south, the rooms on the south side can, with a great deal of certainty, be painted in attractive grays, greens, and even a carefully selected blue. Taking the rooms individually, entrance halls or foyers are best painted the same color as the living-room, which should generally be a warm color, such as a very light sienna, umber, orange, or rose orange.

These colors, of course, are all slightly grayed with their complementaries, so as to form neutral backgrounds for furniture and hangings. Where the apartment contains more than one bedroom, a warm French gray in one room and a light rose apricot in the other room give a good choice. Where the apartment contains only one bedroom, I would suggest a warm grayed ochre color. The bathrooms may be tinted slightly off the white, with an attractive green, more blue than yellow, or a slightly grayed blue. The kitchens, dinettes, servettes, etc., should be kept a bright pastel yellow, not far removed from white. All ceilings should be tinted calsomine (excepting the enamelled bathrooms and kitchens), to match the side walls, but a few shades lighter.

*George H. Van Anda*

*Entrance detail of the Van Tassel Apartments. Making the most of simple materials*

In conclusion, on the subject of painting, the writer has found that by going to the job and selecting a well-located apartment and setting up a simple palette, the colors are then mixed upon a large sheet of glass and tried on the light and dark walls of the room, which have previously been primed. These samples, when found to be satisfactory, may be sent to the paint manufacturer and duplicated in the quantities desired. This will insure a uniform result which is not obtainable by the hit-or-miss mixing method.

Side walls and ceilings of all rooms are best finished in hard plaster. This will allow for a good painting job, and is the basis for any desired effect. Panelling with panel strips not only has a tendency to make the room look smaller, but cuts the walls up into impossible divisions for the placement of furniture and decorations, and should be discouraged.

Picture moulding is generally desirable throughout the apartment with the exception of the kitchen and bathroom. Where the ceiling height is uniform and there are no structural beams exposed, it is most desirable to place the moulding close up to the ceiling and include it in the color of the room.

*Wurts Brothers*

*Details of the Phipps Garden Apartments. Making the most of brickwork*

The general effect in the kitchen should be one of brightness and cheerfulness. A neutral linoleum floor, either in tessellated pattern or solid color, is practical. Solid panelling in the cupboards is recommended. The equipment should include a gas range of standard make, iceless refrigeration, one wash tub and sink combination at least 3′ high, and a hanging clothes-dryer. Provide an adequate amount of electric outlets.

In the smaller apartments, a kitchenette replaces the kitchen. This kitchenette usually consists of a sink, range, icebox, shelves, and cupboards, all compactly placed in an area of a minimum size of 3′ by 10′.

The allowance made in the budget for lighting fixtures of apartments usually means stock design. With the quantity required, it will be found entirely practical for the designer to create his own designs, and in many instances effect a saving over the cost of stock fixtures.

As to flooring, for living-rooms and bedrooms, there is a choice of many types and kinds, such as cement, rubber, cork, wood composition, etc., but experience up to the present has shown that a good grade of oak strip flooring is the most desirable from the tenants' point of view. This flooring should be given a dark stain, to tie the various natural colored strips together, and properly waxed.

For kitchens, where the budget will allow, a yellow pine strip floor, covered with a well-chosen linoleum, will prove satisfactory.

For bathrooms, a black-and-white tile floor in small basket-weave design provides a good appearance. The use of colored side-wall tile is not advisable, owing to the variation of taste of the tenants, and a good commercial grade, slightly off the white, will be more generally acceptable. The height of the side-wall tile should be approximately 4′ 6″ above the floor, with extra height around the tub.

Among the factors that will cause significant changes in future design are the revision of building laws, application of new materials, and the certainty of automatic elevators displacing the walk-up apartments.

Many of the recent projects show a tendency toward modern architecture. If the charm of domestic architecture can be successfully combined with modern design, the housing development of the future will, in all probability, become a distinctive type of architecture.

# The Ratio-Envelope of Form

## *By Rutherford Boyd*

*In the December number Mr. Boyd launched us into a new field of thought, dealing with certain proportional relationships of volume. We were given merely a bird's-eye view of these three-dimensional relationships. There is much to be revealed upon closer inspection, the main elements of which are here set forth.*—EDITOR.

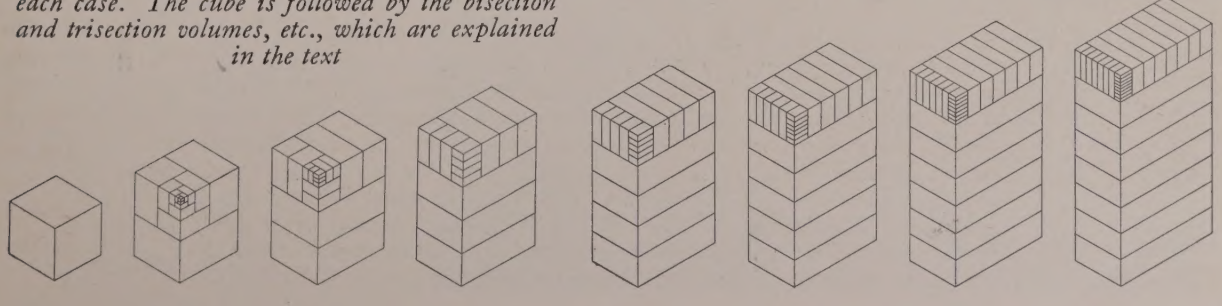


AFTER all our investigations in design, even to this day there remains a great mystery—the extraordinary fact that all known systems of design are based on two-dimensional ideas. The most important of these are series of continued proportions expressed in a linear method, or in proportionate areas on a plane, or in a group of planes such as the exterior and interior surfaces of any edifice.

Yet since the day when the Greeks expanded their ideas of proportion beyond the mere relations of integers, we have had common knowledge of a method of developing a consistent form-organization in three dimensions; in other words, a series of terms in a continued proportion. So, recently, the series of "ratio-volumes" have been invented. These are rectangular volumes in which the height is to the width as the width is to the thickness.

The simplest group of the ratio-volumes are those shown in the eight phases of our diagram, each drawn with the smallest or unit dimension to the left and on the same scale. Beginning with the cube as the limit (whose dimensions are in the ratio 1 to 1 to 1), we develop next the "ratio-volume of bisection." If we bisect the greatest dimension of this form we produce two rectangular volumes each one-half of the original volume, each equal to the cube in mass and each similar in shape to the whole. We must emphasize this unique property: each "ratio-volume" in this group has its own spatial anatomy and no other shape has similar characteristics.

*Beginning with the cube, the elemental series of ratio-volumes, all drawn in similar position and to the same scale, with the unit length to the left in each case. The cube is followed by the bisection and trisection volumes, etc., which are explained in the text*

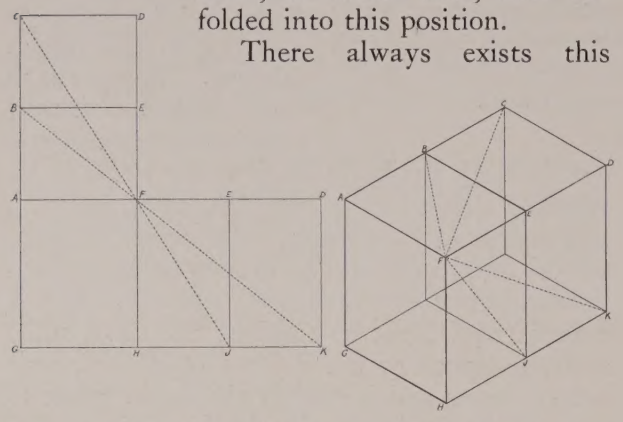


So we proceed with the group: the trisection ratio-volume equals three cubes in mass and one-third of the original volume has precisely the same shape. The fourth ratio-volume equals four cubes in mass, and one-fourth is similar in shape to the whole ratio-volume. And so on to the fifth, sixth, seventh, and eighth ratio-volumes. The eighth is noteworthy and its dimensions are always in the proportion of one to two to four, consequently the mass is equivalent to eight of the cubic units and one-eighth of the volume equals the unit cube in mass and is exactly similar in shape to the original volume. So begins this special series of rectangular ratio-volumes, each increasingly "taller and thinner" as the dimensional ratio increases.

It is simple to remember the ratios in this series, as they are the cube roots of the integer of their division-scheme; that is, the ratio of the bisection volume is the cube root of 2, etc. This process of division can be continued indefinitely, or the ratio-volumes can be expanded in the same way. We have shown here in each one four successive volume divisions. Of course, every volume in each group is similar to the containing envelope of form, its ratio-volume.

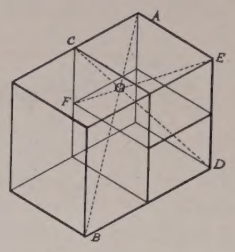
Implicated in this tridimensional form-idea is a simple and important surface development which we will illustrate in the bisected volume. We bisect ratio-volume *A C D K H G*, consequently the half-volume *A B E J H G* is similar in shape to the whole. If we unfold the three surfaces on a plane, it then becomes evident that the end of the rectangle *A F G H* is the same in each case but the largest surface *F D K H* and the intermediate area *A C D F* are the same in length (*F D*) but different in

shape. We realize these two sides must be such a shape that the half of the largest side *F E J H* is similar in shape to the intermediate side, and the half of the intermediate rectangle *A B E F* is similar in shape to the largest face. This is graphically shown by their continuous diagonals, the dotted lines, when unfolded into this position.

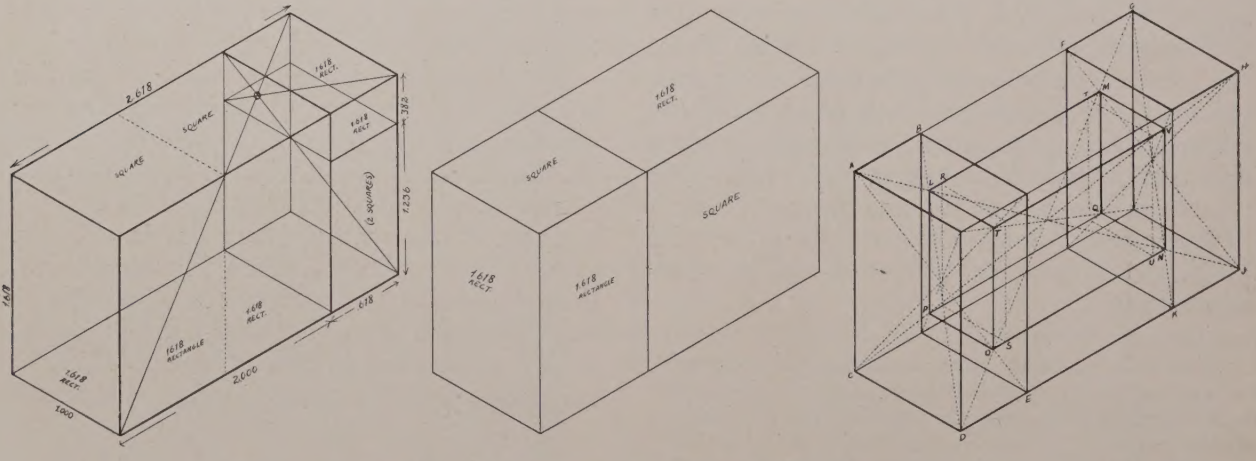


There always exists this unique kind of relation between the areas that form any of the rectangular ratio-volumes. Thus in any trisection volume one-third of the largest face is similar in shape to the intermediate face and the largest face is similar in shape to one-third of the intermediate surface.

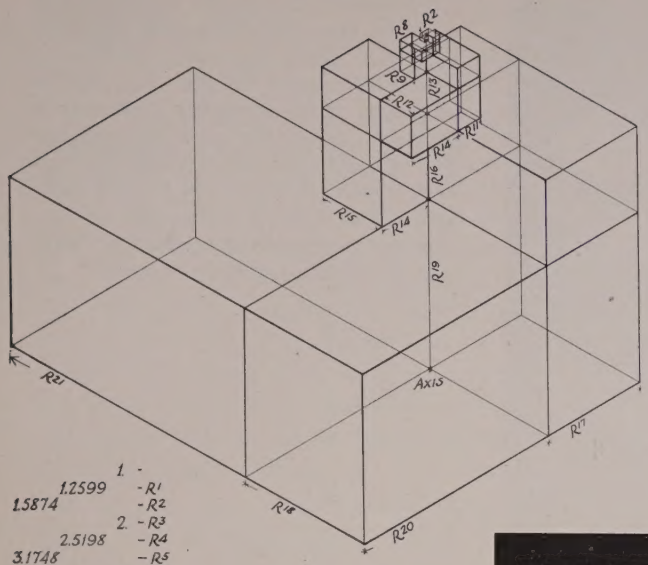
The most important points of the interior geometric structure of ratio-volumes are called the focal points. These are the eight intersections of the main diagonals and those of the subdivisions taken in order. In this bisection volume, *A B* is a main diagonal intersected by the diagonal *C D* of the half-volume and also by the diagonal *E F* of the quarter volume, the next smaller in the series, the point of intersection *O* being one of eight similarly situated focal points.



Always in any series of ratio-volumes, the largest surface of one equals the smallest face of the next larger volume in the series. This fact leads us naturally to the phenomenal development of a series of these volumes around a central axis. We illustrate this organization with the successive members of the "bisection series." This is the only possible arrangement of these volumes with the largest face of one volume coinciding precisely with the smallest face of the next larger volume. The diagram indicates that three volumes are situated around the central axis in each phase. Always the longest edge or dimension of the smallest volume becomes the intermediate dimension of the next volume and then is the smallest dimension of the largest volume. The form-organization then "steps" down to revolve around a new section of the central axis, which in this series is always twice the length of the axial section above it.

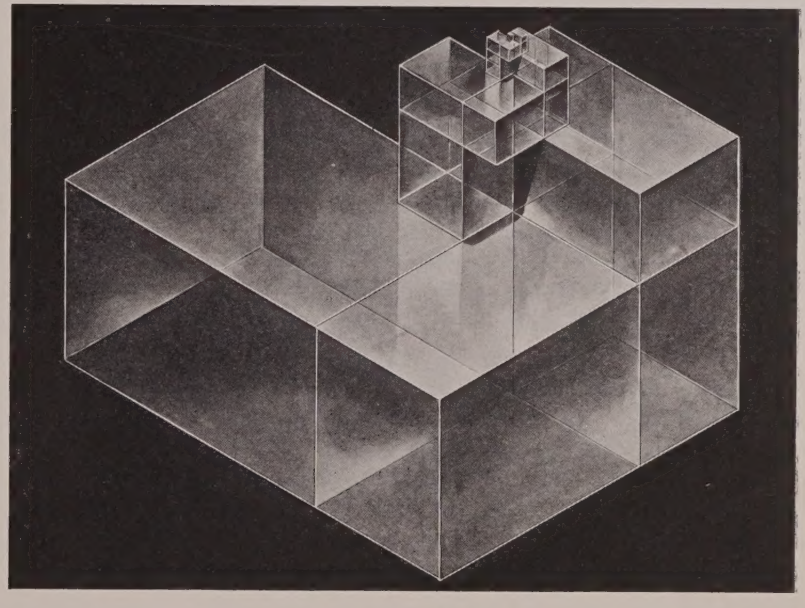


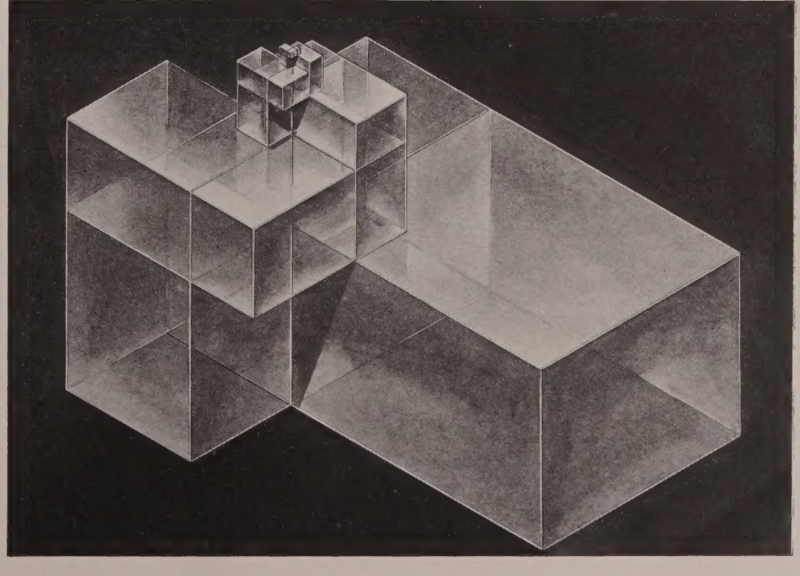

*Three developments of the 1.618 ratio-volume whose dimensions, indicated in the first figure, are 1 to 1.618 to 2.618. The point O at the intersection of three diagonals is one of the eight focal-points. The surface is divided, as marked, into squares and 1.618 rectangles. The central form shows a simple area-plan of squares and on each face a 1.618 rectangle, all alike in size. The third figure shows the reciprocal forms, A B E D C and F G H J K, which are the next smaller phase in every ratio-volume. The "focal-volume" L M V N Q P O T has its corners in the eight focal-points. This focal-volume is identical with the reciprocal volumes which are penetrated by it at each end to the rectangular sections R S and T U*



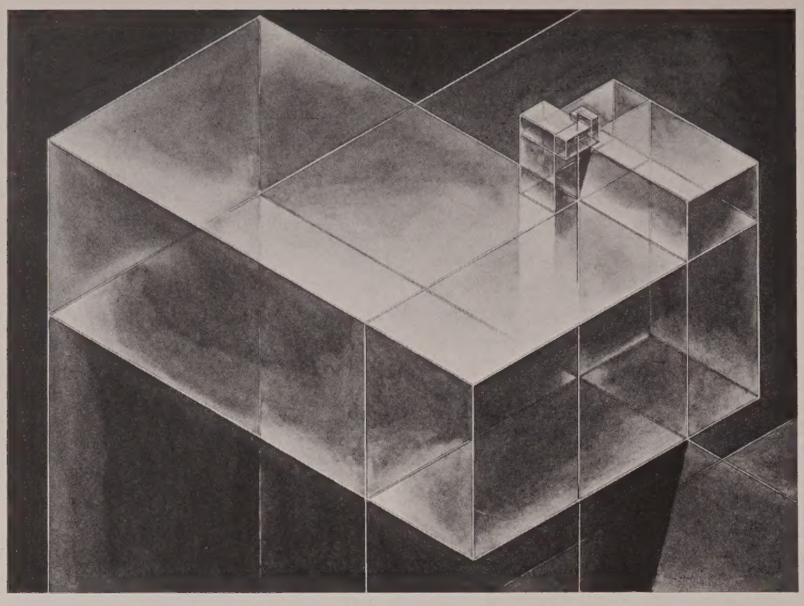

1. -
1.2599 - R1
1.5874 - R2
2. - R3
2.5198 - R4
3.1748 - R5
4. - R6
5.0396 - R7
6.3496 - R8
8. - R9
10.0792 - R10
12.6992 - R11
16. - R12
20.1584 - R13
25.3984 - R14
32. - R15
40.3168 - R16
50.7968 - R17
64. - R18
80.6336 - R19
101.5936 - R20
128. - R21

*The phenomenal development of any ratio-volume series about a central axis, here exhibited in the bisection series. The successive forms are so arranged that the largest surface of each volume coincides precisely with the smallest surface of the next larger volume in the series. Each section of the axis is thus formed by three coinciding edges of three successive ratio-volumes. The dimensions are marked as powers of the ratio R and the actual linear lengths are shown in the table with the dimensions to four decimal places. These are the powers of the cube-root of two, so that every third power doubles the previous length. This is true, of course, beginning with any length in this series of ratios, which doubles the length in three terms of the series*





*Two isometric views of the bisection series of ratio-volumes. Each vertical section of the axis is formed by three coinciding edges of three successive ratio-volumes. Each volume is similar in shape but twice the mass of the preceding volume. Note the "clockwise turning" in the grouping and as only three forms "fit" around any axial section there is always a fourth rectangular space which is vacant. In the lower illustration the same bisection series group is shown from the exactly opposite point of view. Note again the rectangular vacancy which occurs on each section of the axis, first on one side of the axis then on the opposite side. The volumes pass through six different positions in relation to the axis and then repeat the cycle of position*

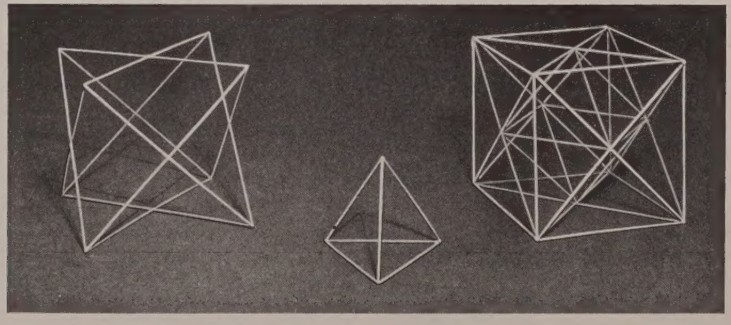


*An isometric view of the axial development of the trisection-series of ratio-volumes. Each successive volume is three times larger in mass but similar in shape. This grouping continues to increase indefinitely as suggested, following exactly the same cycle of six positions in axial rotation, in the bisection-series drawings. This method of rectangular generation is a unique property of all series of ratio-envelopes*

This grouping, with its helical aspect, has some analogies with the cellular increase in spiral shells and other natural forms, but has no real counterpart in nature. In the nautilus shell, for instance, each division is similar in shape and also in position in relation to the nucleus or origin. But these ratio-volumes must of necessity assume three different positions in relation to the axis, one on its end, the next resting on the intermediate face and the next on its largest face; then the cycle of these positions is repeated.

The famous ratio of the "golden section," the so-called 1.618 ratio, generates a rectangular ratio-volume which has been discussed elsewhere, but is of even greater interest in conjunction with the series of other ratio-volumes. It has the unique property, among others, that each volume equals the "focal-volume" of the next larger form in the series. Needless to say, we can postulate other ratio-volumes with unusual spatial properties of their own. But these serve to indicate the elements of a rectangular concept in basic design.

Out of this idea may be developed varied form-organizations in any media which should have an innate force and power that is inherent in their spatial properties. However, we must be content at present simply to introduce this new conception in tridimensional form; it may help toward unifying those two phases of human endeavor which, perhaps for want of a better understanding, we arbitrarily separate into Art and Science.



*The cube, or limiting case in ratio-volumes, with a development in diagonals similar to the interior structure of ratio-volumes. In the cube all the eight focal-points, present in all other volumes in this series, have moved into the centre of the cube due to the cubical dimension ratio of 1 to 1 to 1. The model on the left is formed by the twelve diagonals of the six squares on the cube and forms two interlocked regular tetrahedrons. One of these is shown in the central figure, composed of four equilateral triangles*

# Floating a Sketch

## *By Fred R. Lorenz*

THUMBNAILS! Partis! Criticisms! After making reams of them, the designer had put his best into the final presentation, to go to the committee in a rush. And now for the mount. A lilting tune he whistles during the preparations—then comes the oath, and shivers up and down the room. The mount is a flop, for it *has been* flopped! In turning the dripping sketch over, he ripped the moisture-weakened corners, and paste dripped everywhere. Also there are wrinkles and ridges. Raising one corner, then the next, he tries to work the sketch flat, but cannot do! Is not that a dainty sketch to set before the jury?

As a result, I explained a simple trick I had learned, and the office boys handled the mounting after that with a good fielding average, the occasional errors being for the most part easy to redeem. I will pass it along, for I find a great many still "flop" the wet tracings over onto the mounting-board, *instead of vice versa*, which is less hazardous. The larger the tracing, the harder they "flop," under the former method.

Here is a description of the complete mounting process:

1. The following materials should be at hand:

*Level working surface*—a marble or glass slab, or a sheet of glossy oilcloth. Even a sheet of clean detail paper can be made to serve, in spite of the moisture-buckling. Do not tack the sheet down.

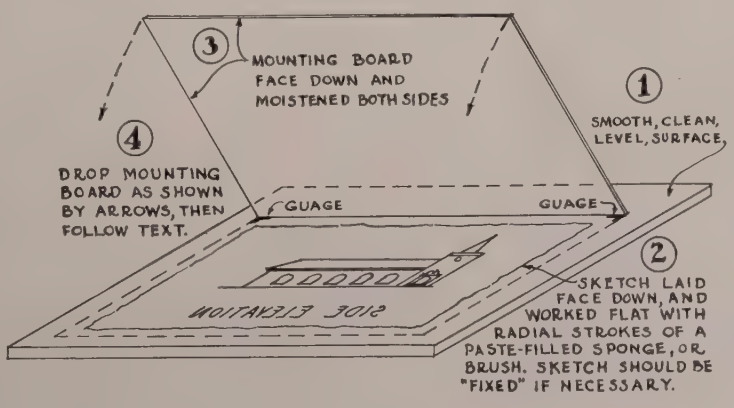
*Bowl of clean water and water sponge.*

*Bowl of cream-thick paste*—may be prepared with an egg-beater and strained through fine tea-strainer or cloth.

*Sponge for paste*—or use wad of cheesecloth, or a brush.

*Clean mounting-board*—moistened both sides to retard paste absorption and to offset buckling.

*6" or 12" scale*, or triangle, without sharp nicks and corners.




*A roll of common buff tracing paper*, width of mounting-board.

*A clean towel* for general purposes.

2. The sketch, previously "fixed," should be laid face down. Dip a sponge in the paste and spread it generously on the back of tracing, using strokes radiating from centre of sketch to edges, until sketch is thoroughly wet and flat, with edges in contact with working surface. Mop up with the sponge all pools of paste lying beyond the edges.

3. The mount-board, large enough to allow for trimming down later to desired size, should be placed in sloping position, shown by diagram, face down. Use no gauging marks on the mount or sketch, but on the working surface beyond the sketch, as shown.

4. Let the board down upon the tracing, the far edge resting on the working surface as a fulcrum. Give the back of board a few radial strokes with one hand, to establish adhesion with sketch, holding the other hand in centre to prevent slipping. The strokes should not be vigorous, but enough to establish a suction.

5. Lift board slowly at one corner, and if that corner of tracing is not lifting with the board, try the next corner. If none of the corners lift with the board, repeat the rubbing; or, with one finger under the corner of tracing, hold it against board and lift up, turning the incomplete mount right side up and mopping the working surface. If proper suction cannot be gotten, there is no doubt that more paste, or thicker paste, is needed. However, it is not wise to use a thick paste, but better to depend on good, generous distribution, saturating absorption by the board, and thorough elimination of air pockets, leaving an infinitesimal film of paste between sketch and board. A thick paste will stain sketch and board more easily, because lack of moisture promotes earlier drying and the paste moves more sluggishly under pres-

(*Continued on page 14*)

*A progress photograph of the Tower of Learning, University of Pittsburgh. Charles Z. Klauder, architect*

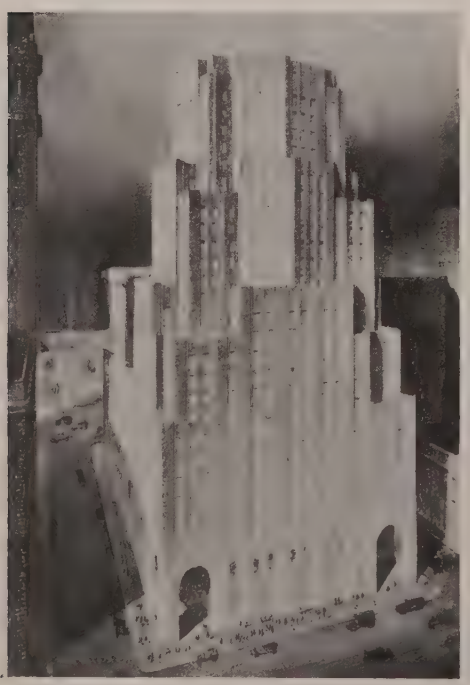
*The Edward L. Doheny, Jr. Memorial Library, recently completed for the University of Southern California, Los Angeles. Samuel E. Lunden, architect*

# Architectural News

*Clark Memorial Hall, the new building for the Department of Law, University of Virginia. Walter D. Blair; Taylor & Fisher; Peebles & Ferguson, architects*

*Chatham Village, the new model housing project made possible by the Buhl Foundation, Pittsburgh. Ingham & Boyd, architects; Clarence S. Stein and Henry Wright, consulting architects*

*The new first unit in the Metropolitan Life Insurance Company's building project in New York City. This first unit is now completed. D. Everett Waid and Harvey Wiley Corbett, architects*



*The recently completed model laundry building, Long Island City, for the Knickerbocker Laundry Co. Irving M. Fenichel, architect*

*New City Hall for Newton, Mass., maintaining the classic tradition of New England. Allen & Collens, architects*

# in Photographs

*All Souls Unitarian Church at Lexington Avenue and 80th Street, New York City. Hobart B. Upjohn, architect*

*The proposed Infirmary Building of the Veterans' Home at Rocky Hill, Hartford, Conn. Douglas Orr, architect; Carl J. Malmfeldt, consulting architect*

*The main tower, from the north, dominating the Indiana World War Memorial at Indianapolis, Ind. Walker & Weeks, architects*

*Front elevation of the Administration Building in Douglas Orr's scheme for the Veterans' Home, which design won an architectural competition*


*The new fur salon in Hutzler Brothers store, Baltimore. Joseph Evans Sperry, architect*

(*Continued from page 11*)

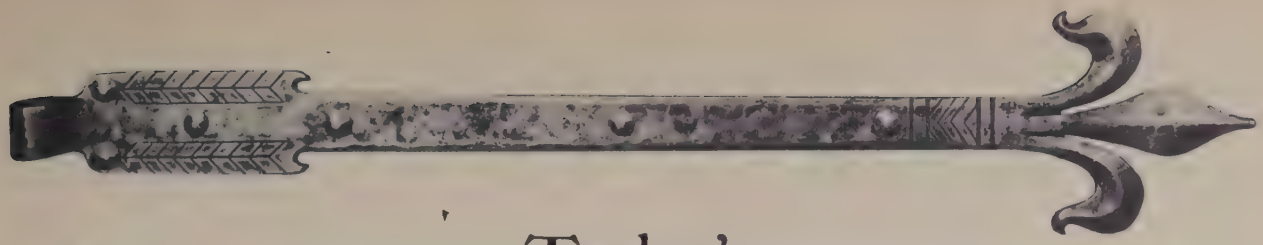
sure of the "squeegee" strokes later. It might be well to again moisten the back of board before turning right side up, so as to balance the expansion taking place on the face since coming in contact with the wet tracing. A backer sheet of same paper as the sketch is sometimes advisable to counteract the buckling effect of the sketch. This may be applied immediately before the sketch, or later when the mounted sketch has dried under the press, and with slightly thicker paste.

To return to the operations: the pressure has squeezed out some of the paste, which, after each squeezing-out operation, should be wiped from the border with a clean wet sponge, especially if no mat or frame is to be applied over the board, so as to avoid discolorations. If paste gets on the face of the tracing, cautious patting and mopping with the sponge is necessary. This must be done thoroughly to prevent sticking to the squeeze-out papers now about to be used.

6. Now, tear off the roll a "squeeze-out" sheet of common buff tracing-paper, large enough to lap over the edges of the mount-board, and lay over same. With the scale or triangle (beware of nicks and sharp corners!) placed edge-down and inclined in the direction of the stroke, make radial strokes from centre to edge. Do not try to get all the paste squeezed out at once. Take it easy, one or twice around. I do not favor the use of the roller, as its effect is a pressure more downward than horizontal. Now lift the squeeze-out sheet cautiously at one corner. If the tracing lies well, remove squeeze-out sheet by pulling toward opposite corner. Chuck it in the basket to avoid getting paste on shoes and trousers while stepping around. Mop up excess paste around edges of mount and examine the sketch. It may not be flat, but if wrinkles and blisters show, they should be ironed out cautiously by the same process given above. An especially bad fold or wrinkle may require a partial lifting of the sketch and inserting a bit of paste for safety's sake. Repeat this operation of squeezing out paste several times with fresh sheets of paper, increasing pressure each time until tracing is absolutely flat. If the first and second squeezings are done carefully and not too vigorously, hardly a wrinkle will require nursing. It is important to use the *radial* stroke at all times to avoid this. Also, speed counts, so as to get the tracing flat and without wrinkles before the moisture from the paste is absorbed to the degree where the paste begins to take hold and set. Caution: beware of holes that may develop in the squeeze-out paper; take a fresh sheet—perhaps foreign particles are under the tracings.

7. If satisfied that the mount is flat and dry enough, place in press, being sure that surface above and below sketch is smooth and level, and has no joints, such as between two books, or between two marble samples. I usually place mount on a drawing-board, protecting the mount above and below with a sheet of buff tracing-paper, and another drawing-board on top, and pile up a few heavy samples or books. The tracing-paper absorbs moisture, thereby hastening the drying, and should be replaced at five or ten minute intervals several times, then left for several hours, or overnight.

8. If a mat is to be used, do all trimming after the mat glue is dry, giving a strong thick edge. It is economical to have the mat made at a picture-framing establishment, where a clean workmanlike job will be done, with or without bevel. The order for a vertical mat would be: "Upright 14½" x 23" opening, top and side borders 3", bottom border 3½"." A horizontal opening is called a "landscape." The ply should be given as single ply, double ply; and the type, such as eggshell and plain; and whether the white or cream side is the face. Individual taste may require, of course, other types and colors of mats. For the mat, LePage's glue, thinned down with hot water, is excellent. Spread evenly with brush, avoiding excess glue at the edge next sketch. After placing mat, clip or clamp it to mount to prevent sliding; then roll vigorously. Remove glue showing at edges with wet cloth or sponge. Sometimes where glue gets on a rendered portion it is best to let it dry in the press and remove later with a knife and a wet cloth, then touch up the rendering.



# Today's Craftsmanship in Hand-wrought Hardware

## *By Gerald K. Geerlings*

*To the left and right are two so-called double-dragon wrought-iron hinges, especially suitable for the narrow doorway*

*At the top and bottom of the page are contrasting strap hinges; both texture and design ably express the material—iron*

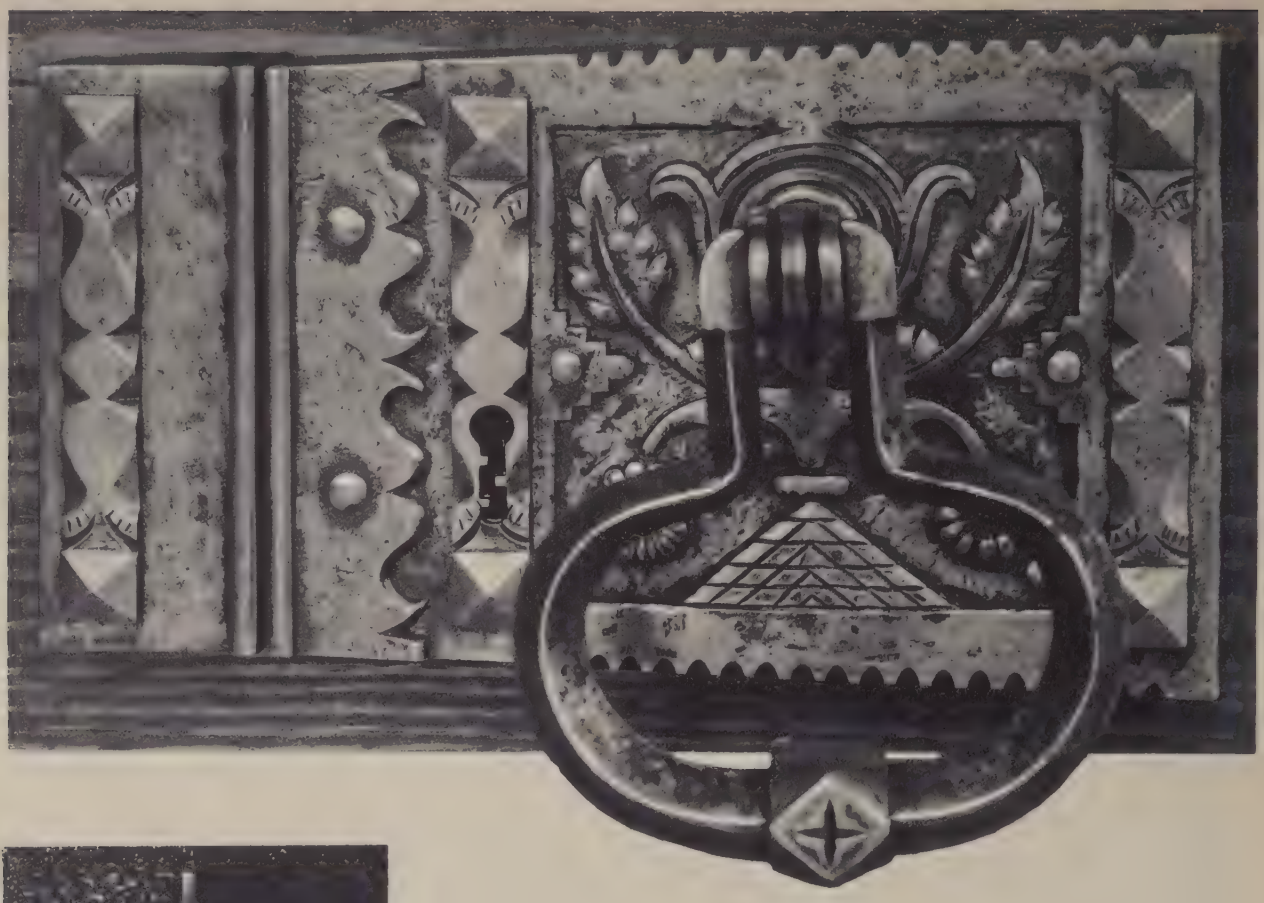
ONE of the obvious, though little considered, differences between pre-machine-age architecture and current architecture is that formerly hardware good or bad was out in plain view, while now, good or bad, it is practically out of sight. Aside from the commercial buildings where this is advantageous, on residential work it is a dubious gain. Until the machine ushered in its products, hardware played an important rôle in the decoration of interiors and was not to be overlooked on the exterior. It was sensible, this pride in hardware, for after all in opening or closing any door one is sure to be conscious of its handle and hinges if they are in view. The old Colonial doors, with their natural-finished iron hinges, made far more of an arresting pattern than our present formula of insignificant knobs and inconspicuous butts lost in a limitless sea of white.

In the modern house the hardware is apt to be relegated to a last-gasp consideration, covered by a mere lump sum in the compilation of contract costs. If the hardware is not considered by the architect to be of any greater importance than just that, quite naturally it gets no more favorable attention when the job is completed. But let us assume that the architect from the outset realizes that the owners of a house live the greater part of the time in its interior, and derive their chief contemplative pleasures from the things about them. He may with perfect logic conclude that the money which it might cost to ornament the cornice, or to build the walls of stone instead of brick, or brick instead of siding, might be the better spent on the interior of the house. Here the architect's decorative work will certainly be as much in evidence as that of the interior decorator, the rug salesman, and the lighting-fixture artist.

All the accompanying illustrations are from work by The Iron-Craftsmen, a very impersonal name for very personal work by two partners, William Zimmerman and James Liberi. The former does all the designing and is a product of Pennsylvania, the latter, either personally or by direction, attends to the execution of all work, and originally came from Rome. For the last twelve years they have been functioning together in Philadelphia, previous to which time both craftsmen were with Samuel Yellin's organization for eleven years.

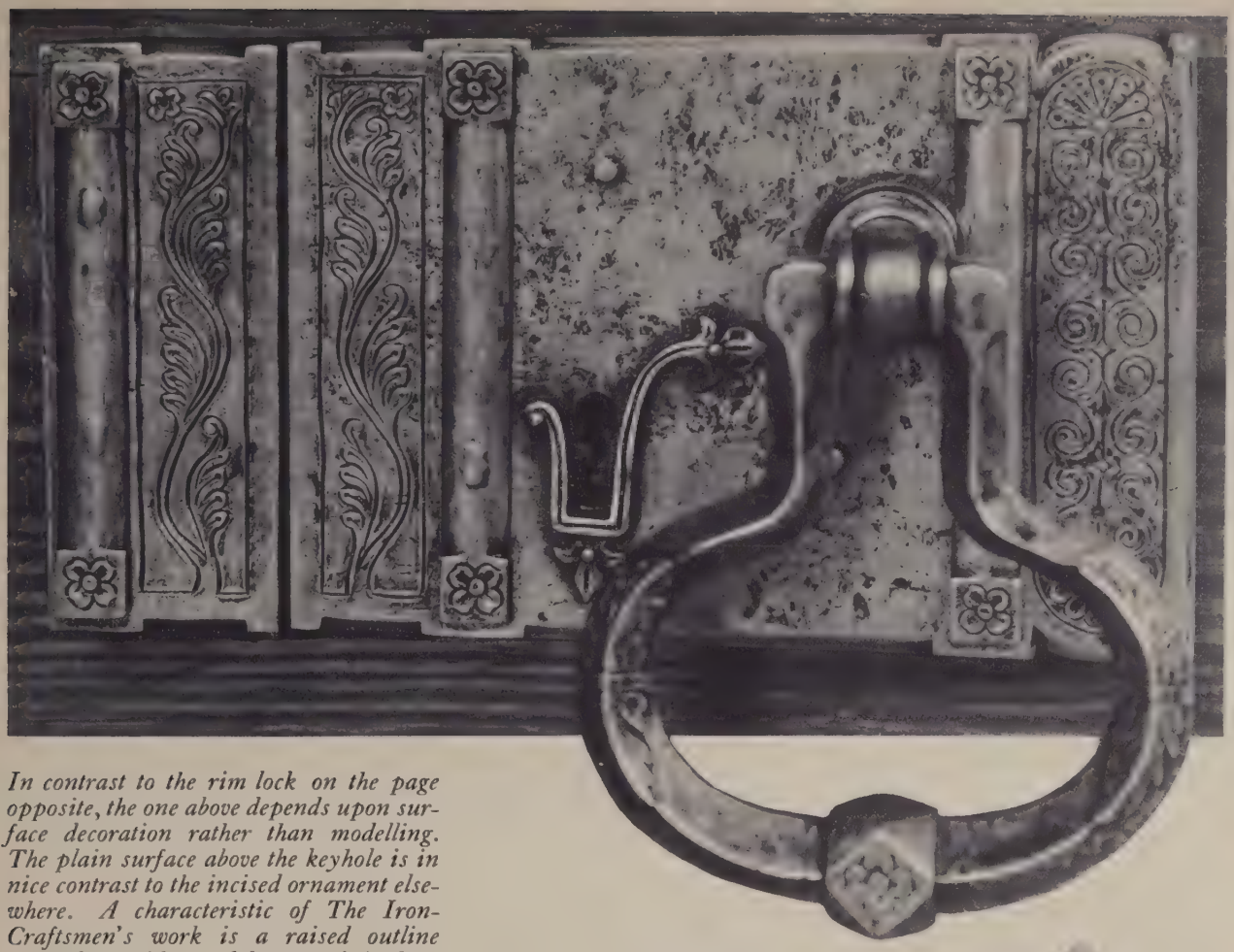
*For the house with Gothic tendencies, or the English periods following shortly thereafter, this assortment of wrought-iron handles and knockers gives a good idea of what can be accomplished in point of variety. All of these are from the residence of F. B. Paterson, at Dayton, Ohio (H. T. Lindeberg, architect). An idea of the scale may be derived from knowing that it is 24 inches from the extreme left to the extreme right. In each case the escutcheons have been made to conform with the stile widths*

*For the typically American house with early Colonial antecedents, this type of wrought-iron hardware is one of the best means to make it of distinguished quality—the client's check book permitting. All the examples here illustrated are genuinely suited to iron, having been designed with the material in mind. Whatever their expense, it is safe to assume that, since they are both utilitarian and decorative, they are of more value to the house than though a similar sum had been spent on cornice modillions*



*With the general acceptance of machine-made locks and their advantageous usage in commercial buildings, we have almost forgotten the decorative possibilities of the rim lock in residential work. Such an admirable example as this in wrought iron serves to illustrate, too, how colorful iron can be, especially if it has contrasting planes*

*If a door to a room is used and not swung back out of sight, the handle or lock probably receives more attention than any other part of the room. Consequently if there is to be architectural decoration, the money cannot be more wisely spent than for hardware which is pleasurable both to use and to see. This design has Georgian tendencies*



*In contrast to the rim lock on the page opposite, the one above depends upon surface decoration rather than modelling. The plain surface above the keyhole is in nice contrast to the incised ornament elsewhere. A characteristic of The Iron-Craftsmen's work is a raised outline around the sides and bottom of the keyhole to act as a guide for the key*

*For the panelled interior door which has narrow stiles, this escutcheon and handle are appropriate. It is one of a number on the residence of Owen Moon, Jr., at Winston-Salem, N. C. (Karcher & Smith, architects). Only ornamentation characteristic of wrought iron has been employed: variations in the surfacing, chisel marks, and twisted handle*

*The knockers below and to the right, both of German silver, are in the residence of A. F. McNichol at Greenwich, Conn. (H. T. Lindeberg, architect). The knocker below is 9 inches high over all, and 5 inches wide. German silver is easily worked, a quality which the design reflects*

*When it is an advantage to conceal the actual means by which the rim lock is secured to the door, the ingenious craftsman has a problem in which he revels. Often ornamented screw heads, or false screw heads, are resorted to, but here the raised leaf portions do the trick*

*For certain periods of architecture or furniture it is sometimes advantageous to introduce the yellow color of brass, and while this material is usually thought of as being primarily suitable for casting, it also is excellent for hand tooling, as is evidenced by this rim lock*

*Photographs by George D. Haight*

# House of LeRoy Kellogg, Pasadena, Calif.

GARRETT VAN PELT, JR., ARCHITECT


*Like most successful country homes in California, the lines are long, low and spreading, in proper humility to a setting that is dominated by the surrounding mountain ranges*

*Mr. Kellogg's house is built around the customary patio, which gives the designer abundant opportunity for roofing the various portions in a manner to express the elements of the plan*

*A porch extends along most of one end of the plan, leading from a corner of the living-room and across two of the main bedrooms. The walls are of brick, painted white*

*Another view of the porch. It is interesting to note the pleasing combination of the early California ranch-house type with its wood-work, and the Spanish window grille of wrought iron*

*Inside the patio. At the extreme left may be seen the bay window forming one end of the dining-room. Color has been secured by the use of brick paving and a few simple tiles*

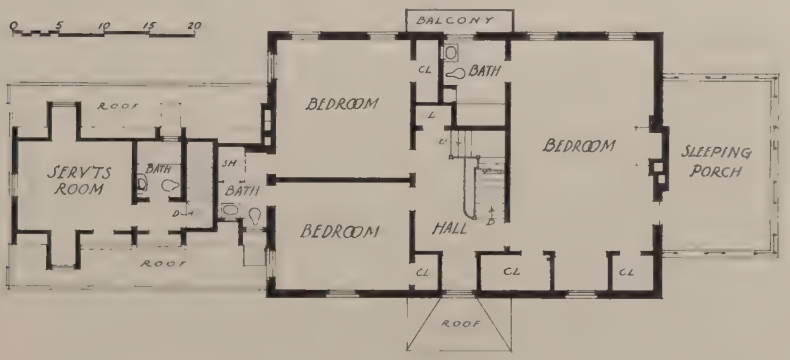
*Mr. Van Pelt has achieved an unusual and quite pleasing chimney top by the use of stepped-back brick supporting a cast concrete cap*

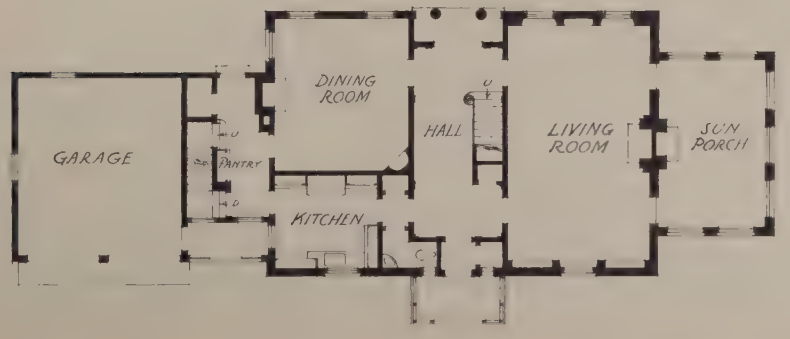
*The living-room takes its key from the furniture of English antecedents—a common concession to those who bring to California an Anglo-Saxon background*

*Photographs by Richard Averill Smith*

# House of O. F. Miller, Kalamazoo, Mich.

AYMAR EMBURY II, ARCHITECT




*Mr. Miller is a building contractor, so that, in plan and materials chosen, his own house reflects the discrimination gained from years of experience in building for other home makers*

*The brick is a local product in soft reds, having considerable variation of tone. A buff mortar is used to tie these together*

*The entrance porch has always been a point of concentration for the designer's activities; here is one that shows a new and refreshing treatment of the supporting members*

*Above, the garden side of the house. The shutters are white for the first story and green above*

*At right, the sun-porch end. The gutter along the eaves of the main roof is made of copper with a cut-out cresting, and the gutter is further embellished by the use of stock lead rosettes such as are used in leaded glass*

*Above, a pictorial wall paper is used in the dining-room, its dominating colors being grays and buff. The woodwork is slightly off the white to tone in with the paper. Inside of the corner cupboard the wall is painted a bronze yellow*

*At left, the main hall. Here the woodwork is a gray white, with some of the ornament picked out in gold*

*Above, the fireplace side of the living-room. A gray buff block-printed paper is used, the woodwork glazed over white to harmonize with it. Below, the sun porch has stucco walls of pale buff, with strong color in the hangings. The paving is of green, black, and purple slate*

# Fair Weather

## AIR CONDITIONING AND THE OLFACTORY SENSE AS THEY RELATE TO INTERIOR DESIGN

*"Everybody is always talking about the weather but nobody ever does anything about it."*

—MARK TWAIN.

## *By Carleton B. Ryder*

*Here is the second of Mr. Ryder's articles dealing with what might be called organic structure. Last month "The Neglected Sense" carried acoustics forward into esthetics. Next month we are to have a revelation of the possibilities in lighting.*—EDITOR.

IT is not facetious to say that such a remark as the foregoing may have played an important part in the development of air conditioning to its present scientific prominence. Even a subtle challenge to one of the dominant primary urges, such as the obstacle to mastery implied above, may provoke worldwide forces. Subconsciously, or not, Mark Twain's quip was well put.

The prevalent reaction to a thwarted urge is to nominate it for oblivion. This we can thank for the faction that considers "fair weather" unimportant, and promotion of air conditioning a "racket." A little attention given to the investigations of the well-known climatologist, Mr. Ellsworth Huntington, reminds us that, estimating the average value of a human life as only $7000, a sudden hot spell in June, 1925, cost the United States $100,000,000. A reverse weather change in February, 1926, cost $500,000,000. In spite of the great toll of those two "snaps" of weather no one thought of relief measures! Climatologists can demonstrate the correspondence of climatic change with the decline of "the glory that was Greece, and the grandeur that was Rome." Even the layman may observe that fashion abides by the dictates of weather—if nothing else. The reason for English "bag" trousers is that the dampness of mode-setting London renders the permanence of a crease impossible!

Although mastery of sun and climate is still beyond our reach protection can be had in shelter. Scientists, physicians, engineers have "done" much "about the weather." The American Society of Heating and Ventilating Engineers and other foundations have been formed for the co-ordination and sponsorship of such work and research. Now residence, apartment, office, or other structure can number "fair weather" among its furnishings.

This inspection must, due to the size of the sciences involved, confine itself to briefs of physiological cause and effect, psychological cause and effect, relation of the two to interior design, with conclusions on the indicated trend of development.

The air acts in two ways with respect to its physiological effects:

1. As form of sustenance.
2. As aerial envelope.

The first refers to the useful gaseous composition of the air for assimilation into energy through the lungs, also modifications of usefulness by suspended foreign matter, such as smokes, fumes, dusts, bacteria, and so forth.

The useful components are too well known to concern us here. Modifiers of usefulness are more important. The not uncommon quantity of impurities in air is evidenced by measured soot fall of over one thousand tons per square mile per year in Pittsburgh. Carbon monoxide, lead, and other poisonings following from industrial contamination are constantly detrimental and occasionally serious. Bacteria require other agencies, such as deterioration of lung action by dust or other deposit, drying up of mucous protection, and increased susceptibility due to upset bodily thermal balance, if they are to be effective. It is a common fallacy that undetermined toxic matter can be substituted for useful components through respiration. The effect of carbon dioxide in vitiated air and general pollution is relatively unimportant in comparison with optima in other respects.

The term aerial envelope refers to all effects of enveloping air upon retention of the body's thermal balance, and comprises four or more variables:

1. Temperature.
2. Humidity.
3. Motion.
4. Ionization.
5. Unknown

The first three may be combined into a single index (as shown in Figure 1) known as Effective Temperature index, since each contributes to the sensation of warmth felt by the human body.

A physiologic sketch may explain this interrelation. The body strives to maintain a normal thermal level of about 98.6° F. Maintenance is effected by heat production and heat loss. Metabolism, the combustion of food, produces

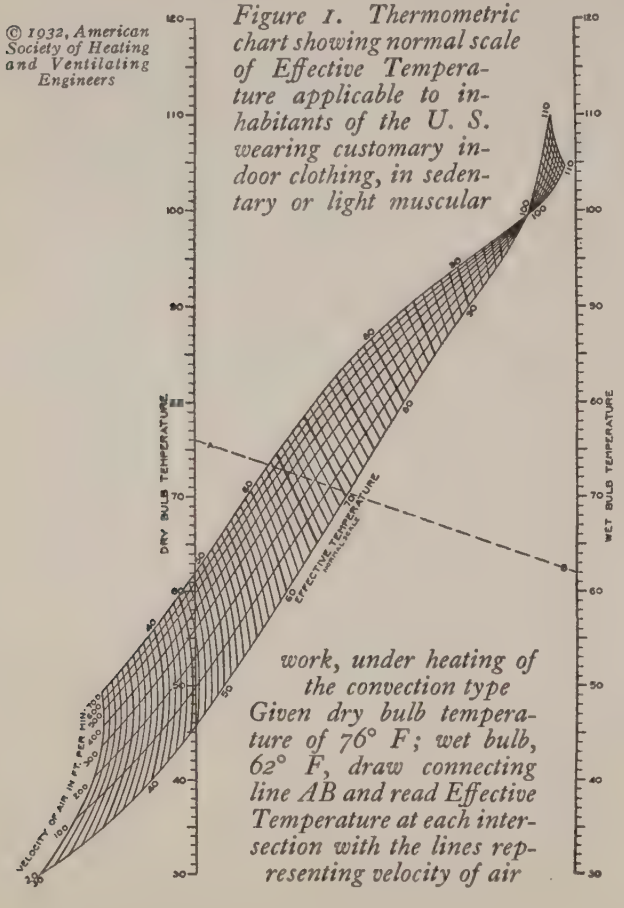



*Figure 1. Thermometric chart showing normal scale of Effective Temperature applicable to inhabitants of the U. S. wearing customary indoor clothing, in sedentary or light muscular work, under heating of the convection type Given dry bulb temperature of 76° F; wet bulb, 62° F, draw connecting line AB and read Effective Temperature at each intersection with the lines representing velocity of air*

heat which emanates from the body surfaces by radiation, convection, and evaporation. A most intricate sense-nerve-muscle sequence functions —a veritable human thermostat—to regulate this emanation by co-ordinated control of the chemical heat production, the cutaneous or surface blood circulation and operation of sweat glands.

Now, if external temperatures are low with relation to internal, constriction of cutaneous capillaries reduces heat loss. Increased adrenalin secretion facilitates internal heat production. If external temperatures are relatively high, automatic inhibition of heat-producing organs, such as the liver, follows together with expansion of surface capillaries. The sweat glands are set in operation to cool by surface evaporation of moisture, and for faster waste clearance.

As a result it follows that the rate of evaporation is regulated by the amount of water vapor already present in the air; it is further affected by the bulk of air brought in contact with the body through air motion. Convection from the body is likewise affected by air motion. Thus we see the contribution of several factors to the combined index termed Effective Temperature.

Adaptability of the body is only efficient within certain limits. Prolonged subjection to high temperatures results in abnormal rises in metabolism, body temperature, heart action, respiratory rate, rate of chloride loss in perspiration, and may lead to organic failure. At 100° Effective Temperature the human body *at rest* averages a pulse rate increase of forty beats per minute per hour, and a weight loss of 1.7 lbs. per hour. Under conditions of excessive cold equally detrimental effects take place in the unprotected organism.

The American Society of Heating and Ventilating Engineers, as the outcome of manifold research conducted in co-operation with U. S. Public Health Service and U. S. Bureau of Mines, have prepared a chart of Effective Temperatures to which are applied zones of comfort for winter and for summer. This "Comfort Chart" is illustrated in Figure 2. Other determined optima for specific types of work, and still others for effects on materials wherever shrinkage or expansion is an industrial factor, may be obtained from the publishings of the A. S. H. V. E.

Air-conditioning systems are now designed so as to maintain constant air purity, humidity, movement, and temperature at an "optimum" indicated by the "comfort zones." But much study is being focused at present upon the probable importance of Effective Temperature fluctuation. The subject is being approached from two viewpoints. A group most intimately associated with practice, such as Dr. W. J. McConnell, of the Metropolitan Life Insurance Company, and C. P. Yaglou, of Harvard School of Public Health, both of the A. S. H. V. E., recognize the inability of a mean comfort line to suit every one. Another group more devoted to research, such as Dr. C.-E. A. Winslow and Dr. Leonard Greenberg, of the Yale School of Public Health, believe reasonably exercised adaptation to be of physiological importance.

The tests by which the "comfort zones" with their mean "comfort line" were determined showed considerable difference of opinion among the test subjects; also each subject's individual line of greatest comfort varied from time to time.

The latter results from a complication of variables, such as type of work, clothing, habitual exposure, changes in the rate of metabolism. This abbreviates the need for a happy medium or some effective equivalent.

The second argument is brought out by figures that, for example, show an average lowering of the death rate during moderately stormy—changeable—periods. In general, continued subjection to uniformity of temperature, such as

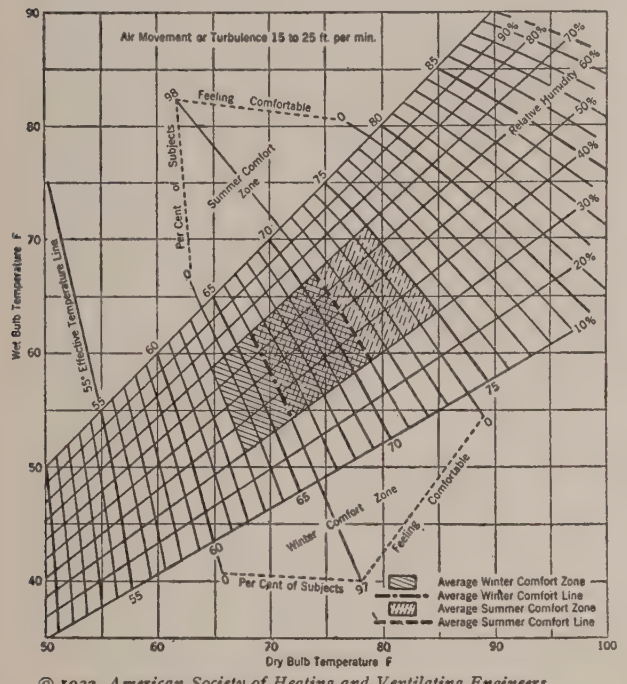





*Figure 2. Comfort or Effective Temperature chart for air velocities of 15 to 25 f.p.m. (still air). This applies to inhabitants of the U. S., and the winter zone is further limited to rooms heated by systems of the convection type. Summer comfort zone is limited to homes, offices, etc., where occupants become fully adapted to the artificial air conditions—not to theatres, department stores, and the like*

extended calms of warm or cool weather, develops specialization at the expense of adaptability. The result is lowered resistance. For example, decreased adaptability means delayed reactance to change. The capillaries in the mucous membranes contract during an even cool spell; a sudden temperature rise finds them unprepared to expand at a normal speed. Bacterial growth gains headway before counteractive forces are resumed. A cold may result.

Furthermore, the human body is subject to what is known as "sensory thresholds," when detecting changes in degree of sensation. A violin readily audible in a quiet room would not be heard if the player were to take up his stand upon a busy thoroughfare. The proportionate increase in sound volume is insufficient to trip the sense "relay" that delivers the violin stimulus to the brain. The same applies to variations in temperature and even differs with the direction of the shift, because the number of warmth receptors, or sensory endings, is considerably less than that of cold receptors. This characteristic intensifies the effect termed "unpreparedness," *but suggests the practical means of solution.*

The separation between positive and negative thresholds of temperature sensation amounts to actual degrees Fahrenheit. Therefore, fluctuation within the "comfort zone" may be so timed and so limited that it would be between conscious thresholds of most people and yet, due to sensation lag, only be slightly noticeable to extreme subjects. The effect would be maximum or near maximum comfort for every one, with imperceptibly exercised adaptation—the practical "happy medium."

A method of this nature can be applied through existing air conditioning apparatus with little further study and would probably initiate notable improvement. But a great step is imminent.

Heat may be transmitted by convection, conduction, radiation. The first two methods constitute heating of a medium, such as air or matter, by contact with the source of heat. Transmission is effected by movement of air or homogeneous contact of matter. These are the methods most employed today. They make no discrimination as to thermic *character.*

Heat may be transmitted by direct radiation, or, to be more exact, induced by the resistance set up when an object or person intercepts radiant energy of certain wave lengths or frequencies.

A radiant energy spectrum is about equally divided by the frequencies visible in the form of light. From this division, as the frequencies decrease or the wave lengths increase we traverse the "infra" side of the spectrum. Reversely, as frequencies increase and wave lengths decrease we traverse the "ultra" side. The difference in type of energy between the "dark" or low frequencied rays and higher frequencied rays may be characterized by an analogy. Dynamite drives wedges of energy into a boulder, breaking it, and hurling the fragments some distance. Fulminate would pulverize a part of the

same boulder and leave the rest intact. The "dark" rays resemble dynamite. They are slower in action, appear to flow around objects or pass through fissures, longer retain their energy. These are the type of rays emitted by common heating surfaces—radiators, stoves, and so forth. The higher frequencied rays resemble the fulminate. They have great speed of action, penetrate deeper into obstructions, but sooner exhaust their energy.

It will be seen that certain rays may be fast enough to permeate the body and yet not so fast as to dissipate their energy before reaching a beneficial depth. A few of the still higher "ultra" spectrum waves cause important physiochemical reactions, near the surface of the body, having a beneficial effect upon the blood, but are ineffectual as heat producers. Both of these types of solar radiation, as expressed in the words of Professor C. P. Yaglou, Harvard School of Public Health, are "not merely desirable, but essential to life." This is the thermic character that present heating systems lack.

There is now in development a new type of electric bulb that will emit visible and invisible radiant energy similar to sunlight but exclude harmful rays. It will deliver them in sufficient intensities to be of practical use as a heating element. This offers the solution to heating and air conditioning. It may also control the fourth characteristic of air, its electrical potential or ionization.

Pure outdoor summer air approximates a potential and polarity of about 560 positive ions and 500 negative ions. This is subject to change both in sum and balance. Little is definitely known concerning the physiological effects traceable to this quality; although experiments have indicated the association of excess positive polarity with increased blood pressure and nervous decay, and vice versa. Under test, ionic potential in a room has been found to drop with human occupancy at such a rate that maintenance by change of air becomes prohibitive under at all crowded conditions. It is also probable that metal air-conditioning ducts materially affect the ionization.

With these deficiencies of prevailing systems and possible improvements in mind, the inferred design of a future air-conditioning installation may be forecast. It would employ the energy-radiant electric bulb so located as to diffuse its rays directly and indirectly throughout the room. Supplementing this, an air-conditioning system will introduce properly filtered, tempered, and humidified air in large volumes and at low velocities. Thus drafts are obviated, predicating effectual structural insulation. The convected temperature would have a mean of about 55° F. to maintain the refreshing quality of the air in contact with the body. The radiant energy holds Effective Temperature up to the "comfort" level and keeps all surfaces or objects upon which it falls at a temperature that will prevent convection to or from undesired sources. This precludes sensations of heat or cold upon physical contact or approach. Relative humidity will be fairly high, about 55 or 60 per cent, simulating the outdoor relative humidity, considered most healthful. This will also minimize dust suspension. Lastly, the previously mentioned fluctuation might be obtained through varying velocity and direction of air motion, thus varying Effective Temperature. This fluctuation should be extended to compensate for natural changes in internal heat production; there should be compensation for higher body temperatures during and after eating and toward the end of the day. In office applications the control might vary before and after hours of exposure so as to reduce the contrast between interior and exterior Effective Temperatures.

It is at this point that development of the subject proceeds from physiological to psychological considerations.

The present-day pioneers are precisely those who are advancing into the latter field of research. The human equation cannot quite be determined without the aid of psychology. The implication that the modern technical air-conditioning engineer must needs become a psychologist might by some be construed as the insult upon injury, but its truth cannot be better defended than by a review of the logic of the first paragraph.

In the previous article, "The Neglected Sense," crude generalizations on the psychological factor were given. Here it will be well to trace in greater detail the sequence from effect to cause. The sensory receptor reacts to stimulus. The reaction is then relayed through the nervous system. The nerve centre receives the impulse, classifies it, and files it for the immediate attention of other nerves whose office it is to stimulate the proper muscles for compensative or protective reaction. A single sensation impulse is not confined to a single neural path. Instead there are interconnections between almost every path. Usage is the principal

determinant of the course of the impulse. The resistance to impulse flow through any particular sequence is decreased with exercise.

In the first place, organic needs determined certain sequences. In the second, heredity either confirms or modifies such primal sequences and instigates new or more complicated ones. With these two types of sequences we are born. Thereupon, environment, association, and personal habit begin to confirm or modify inherited sequences and instigate still others. It must be understood that this last process follows from exercising dormant connections.

Study of physiology and heredity has reduced the fundamental reactions or responses to well-defined constants. Inasmuch as habit, association, and environment are largely derived from heredity, the personally inherited reactions to stimuli may be determined within narrow limits; variations within these limits are almost entirely determined in childhood or youth. A study of that period of an individual's life will make it possible to predict with accuracy his reactions to any given stimulus.

This leads us to the conclusion that we have three specific types of reaction to contend with in applying the psychological hypothesis to air conditioning:

1. The habitual response.
2. The functional response.
3. The illusional response.

Admitted or not, the first is a name for the bane of the air-conditioning engineer's life. A highly perfected conditioning system may be installed and its benefits nullified by a personal belief that windows must be opened. Exhaust grilles may be insulted with a conviction that they are sources of drafts. The most efficient automatic controls may be rendered superfluous by an individual's opinion that he "knows better," though as a matter of fact his knowledge may be confined to politics! Frankly, the only plausible solution here is to "play politics," to concede the point openly and deny it in fact.

Definition of the second or functional response is derived from knowledge of hereditary modifications. The determination is less personal, and more easily applied. Through control of these reactions one may facilitate the pursuit of a given occupation. By association, one may reversely produce anticipation before the occupation presents itself. It is self-evident that application to air conditioning must vary to conform to the purposes of different rooms; it must also vary temporally.

An Effective Temperature spectrum for functional response is derivable. Its lowest end corresponds to the highest degree of physical work or metabolism. Temperature increases with the decrease of internal heat production, is midway for mental work and reaches the highest end of the spectrum when complete relaxation or sleep is desired.

An ionization spectrum displays association of positive predominance with nervous tension, of negative predominance with nervous relaxation.

A radiant energy spectrum displays association of the lowest frequencies with general lassitude, of the higher with alertness.

An olfactory spectrum of functional reaction deserves more comment. It is by the olfactory or sense of smell that we not only evaluate the purity of the air as sustenance but qualify the condition or object accessory to the gases detected by the organs of smell. But the multiplicity of conditions or objects to which this sense may be applied is so varied that in generalizing the only common factor is appeal or repulsion to the appetitional instincts. Desirability or appeal may be associated with appetizing or fragrant odors, repulsion with nauseous or acrid odors. Specific problems of this sort are not difficult to analyze and solve chemically in the laboratory. For that reason it is entirely unnecessary that present or future generations be constrained to put up with unpleasant odors such as those of linoleum, carpet, rubber, leather, fabric, paint, plaster, and innumerable other common materials, when they can not only be deodorized, but be given odors that will promote the use to which they may be put. Dr. D. A. Laird, Director of the Psychological Laboratories of Colgate University, has gone so far as to investigate the psychological responses to perfumes and odors, and found them a material factor for commercial purposes. There is no better human barometer than sales.

The last of the three types of response, the illusional, may be defined as the manipulation of response for ulterior purposes. As previously indicated, the sequence from stimulus to response may flow through various channels. Two or more stimuli may contribute to the same response. If two stimuli have become habitually associated in producing a response, the presence of one without the other will not only produce the response, but imply the presence of the other though it be absent. This is illusion and is widely employed throughout interior design. With

particular reference to the subject of air conditioning, it is possible to convey impressions of nearness of a surface by concentrating warmth upon it, of distance, by increasing its coldness. Reactions of warmth may be produced by glow, even brightness of color, and vice versa. Control of ionization may produce sensations of intimacy in a large room and seclusion in a small one though it be crowded.

To conclude, all variations for psychological reasons should be applied within the extreme boundaries of physiological comfort zones. In procedure a conditioning installation such as that described before would be adjusted for a temporally varying physiological comfort zone. Next, function will determine the comfort line within that zone and be subject to modification according to psychological needs. Then about the thus determined comfort line as a median the Effective Temperature will oscillate within the boundaries of the initial comfort zone. Lastly, radiant heat may receive additional concentration on certain surfaces, and may be controlled for illusional reasons.

The writer believes it evident that air-conditioning design is most intimately associated with interior design. The air-conditioning engineer is prepared for, and looking to, such progress. His co-operation may be considered an assured fact, and his advice should be indispensable to the interior designer.

The elaborate and novel appearance of the theory of air conditioning herein proposed and predicted must not be construed as indication of its remoteness. It can be adopted in part today, in greater part tomorrow. But the possibilities for tomorrow are the direct result of today's study. Research is only restricted by demand and that demand must come from the readers of this article. So, with emphasis again directed back to the initial importance of "fair weather," it is hoped the subject will "not be nominated for oblivion."

## BIBLIOGRAPHY

*(With acknowledgments for much of the foregoing)*

*The Pulse of Progress*, Ellsworth Huntington. Charles Scribner's Sons, publishers, New York.

*Civilization and Climate*, Ellsworth Huntington. Yale University Press, publishers, New Haven, 1924.

*Studies on the Industrial Dust Problem*, Leonard Greenberg. United States Public Health Service Bulletins, 1925.

*How Human Beings Respond to Changing Atmospheric Conditions*, W. J. McConnell. Amer. Inst. of Min. and Met. Eng., *Technical Publication* No. 319, 1930.

"Physiological Responses to Heat," H. C. Bazett, *Physiol. Rev.*, 7, 531, 1927.

"Humidity and Comfort," W. H. Howell, *The Science Press*, April, 1931.

"Effective Temperature with Clothing," C. P. Yaglou and W. E. Miller, *Trans. Amer. Soc. Heat. and Vent. Engs.*, *31*, 89, 1925.

"Effective Temperature as Applied to Industrial Problems," C. P. Yaglou and W. E. Miller, *Trans. Amer. Soc. Heat. and Vent. Engs.*, *30*, 339, 1925.

"Determination of Equal Comfort Zone," F. C. Houghten and C. P. Yaglou, *Trans. Amer. Soc. Heat. and Vent. Engs.*, *29*, 361, 1923b.

"How to Use the Effective Temperature Index and Comfort Charts," Report, *Heat. Pipe. and Air Cond.*, June, 1932.

*Guide*, Amer. Soc. Heat. and Vent. Engs. New York, 1932.

"Air Conditioning," C. T. Larson, *Architectural Record*, September, October, 1932.

"Humidification for Residences," A. P. Kratz, Univ. of Ill., *Eng. and Station Bulletin* No. 230, 1931.

"Are Present Methods Too Crude to Endure in Air Conditioning?" C. P. Yaglou, *Plumb. and Heat. Conts. Trade Jour.*, March, 1932.

"Changes in Ionic Content in Occupied Rooms Ventilated by Natural and Mechanical Methods," C. P. Yaglou, *Jour. Sect., Heat. Pipe. and Air Cond.*, October, 1931.

*Fundamentals of Objective Psychology*, J. F. Dashiell. Houghton Mifflin Company, 1928.

*The Fundamentals of Human Motivation*, L. T. Troland. D. VanNostrand Company, 1928.

OTHER AUTHORS

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# Some Pitfalls in Supervision

## *By W. F. Bartels*

### XXVII. ORNAMENTAL IRON AND BRONZE

(*CONTINUED*)

BEFORE setting the saddles the superintendent should check both the architect's drawings and the shop drawings. Then he should inspect the saddles to see that they fulfill all requirements. They should be the full width of the opening, yet on many jobs one may observe saddles short of each jamb by as much as one-half inch. If, on one or both sides, the saddle is supposed to be met by marble the superintendent should check the marble shop drawing to see that this is provided for. This may avoid delay or an unworkmanlike condition of the marble being short. When being set the saddles must be carefully checked. Any deviation from the correct level or elevation will be obvious very quickly when the finished floors are laid. Many sloping stair platforms and disagreeable looking humps at thresholds can be traced to improperly set saddles. The superintendent must see that all saddles are well grouted. In the case of exterior doors it may pay to have the saddles set in mastic. This will often prevent the seepage of water underneath resulting from a stiff rain.

If the buck has been set true it will not be difficult to set the trim properly. If it has not, however, the mitres of the trim will probably be broken and will not fit the buck snugly, causing an altogether shoddy appearance. Likewise the hanging of the door must be done carefully. A certain allowance for clearance at the edges has been made in the construction of the door. Hence if the buck is properly set and the saddle is at the correct elevation the door will be hung with little difficulty. The superintendent should endeavor to prohibit the padding of hinges. This results only in an uneven ugly crack between the door and its frame.

A section of the door, as well as a full description of the materials composing the door should be furnished to the superintendent, whether it be the main entrance door or only a small access door. They may both appear on the job made of thinner or cheaper material than is called for. Then too, the finish of all doors, as well as the construction, must be carefully checked. The finish of ornamental doors often influences their construction and hence this must be checked to see that it will not be the cause of the mitres opening up or the metal covering pulling apart at the edge of the door. Often to cover small defects the exterior of the door will be so burnished or ground down that very little of the metal is left.

Ornamental windows should be carefully set and aligned. The material of which they are fabricated should be checked to see that it agrees with the specifications. The mitred work should be gone over carefully to see that there are no ugly gaps, solder and welding marks, resulting from the vain efforts to pull members together which really did not fit. Some contractors will fill up gaps, cracks or holes with a form of putty or other filler, and then hope it will not be detected because of its height above the ground. The observing superintendent will not let such practice escape him, and the contractor should be required to remove the faulty unit.

All grille work coming on the job should be examined as to design, material and construction. If it is cast it should be examined to see that it has been properly machined down, if this has been called for. Then too, there should be no excessively rough spots nor too many sand holes. If the casting is a thin one it behooves the superintendent carefully to examine all parts immediately upon their arrival. Sometimes breakage in the factory is blamed upon the job. Often it will be found that a breakage has occurred and that an ineffectual attempt has been made to remedy this by welding or patching of one sort or another.

In general the inspection of bronze work, as with iron work, consists of the examination of the material and the close inspection of the execution of the work. Color texture, hardness, and many other items are amongst those the superintendent must examine and be familiar with. But before attempting the inspection of bronze work the superintendent would do well to equip himself with several good treatises on architectural metals. Otherwise he will be besieged with so many terms for the same article that he will be not only puzzled but chagrined. With the many compositions of metals on the market today the time he may spend in their investigation will be well worth while.

## HARDWARE

HARDWARE holds an unenviable job in any building. If it works well it is soon apt to get no attention. If it causes inconvenience it comes in for an excess of attention. It is expensive and annoying to replace or repair hardware, so that what seems like a high initial cost may easily prove to be cheapest in the end.

At the present time, particularly in the building trades, many manufacturers of high-grade articles are turning out products below their usual standards in order to meet the fierce price competition they have been forced into. Care must therefore be exercised to obtain the specified articles upon which the manufacturer has made his reputation, and to be sure that the quality has not been lowered.

Hardware is usually visualized as consisting chiefly of locks and door knobs. Locks should work easily and efficiently. Often the face plate, instead of being solid brass or bronze, is merely plated. The case should be cast and the springs examined to see that they are of a good grade so that they will not lose their snap or else not work at all after six months' usage. The bolts should be long enough to catch. Among the cheaper locks the bolts are apt to be short. Used in inexpensive work they are particularly undesirable, because it is in this class of work that door shrinkage, settling, and poor alignment of plate and lock most commonly occur. Hence, after a few months in such installations bolts may catch by only the smallest fraction of an inch, thus adding to the sense of insecurity. For cylinder locks it is indeed poor supervision that allows a good lock to be cheapened by plated trim on the outside of the cylinders. Bathroom locks are often operated only by a small knob on the inside. It is well to supplement this with a means of obtaining access from the outside in case of sickness, fainting, or a child's locking himself in. A key best serves this purpose.

Knobs, escutcheons, and roses are stamped, cast, wrought, or spun. Stamped types are less desirable because of the thinness of the metal, and hence less expensive—except in those cases where they are well plated and palmed off for the real article at a slightly lower price. Cast types are more desirable from every point of view. Glass knobs should be so well made as never to come off in one's hand. The superintendent should be sure that the knobs, butts, window catches, pulleys, etc., are of the style and material specified. After proclaiming loudly that the hardware is cast brass or bronze, many a contractor has been seriously embarrassed when the superintendent has taken out a small magnet and found that it was so attracted to the "brass or bronze" that it stuck fast to them. Of course the usual alibi is: "I took my dealer's word for it." As alibis go it is a splendid one, for there is no law compelling the hardware contractor to previously test the hardware himself instead of taking his dealer's word for it.

Window pulleys should not be passed over lightly—except by the sash cords. At first glance they seem unimportant. But if their every-day use is considered it will be seen that they should be chosen with care. The common variety is stamped. These are the least expensive. Preferable are those of cast iron, brass, or bronze. After paying for high-grade sash cord (Sheridized or a similar grade of sash chain) it is false economy to jeopardize their functioning smoothly by using an inferior pulley.

Similarly, in door springs and door checks, an inadequate or inferior article should not be used. Spring hinges on apartment and office doors are subjected to heavy and oftentimes abusive use. They should be of a size commensurate with the door size and usage, and of such caliber that they will need but little adjusting and less repairing. Door checks should be chosen with due regard to the size, weight, and location of the door. Heavier doors obviously require heavier closers, and doors opening to the outside should have allowances made for the wind which may affect them. Doors opening at high elevations (penthouses, etc.) are subject to severe winds and therefore as an additional precaution should have chains bolted through the door and connected to the frame so that on opening the door in a gale it will not be torn off the check. In the installation of floor door closers it should be required that they are substantially fastened. Many mechanics are prone to use plaster of Paris in setting them, evasively stating that they will "fix them up later" or that the "floor will hold them in position." The former is forgotten more times than remembered, and the latter is only partly true. The use of plaster of Paris in a cinder fill cannot be expected to last very long.

(*To be continued*)

*In the dining-room the plastered walls have a slightly rough parchment surface, and are painted café au lait with a trace of pink. Coved cornice and ceiling are covered with silver-leaf lacquered a very pale gold. Carpet is mouse color; furniture of rather light walnut with a strongly defined grain; the leather upholstery, jade green*

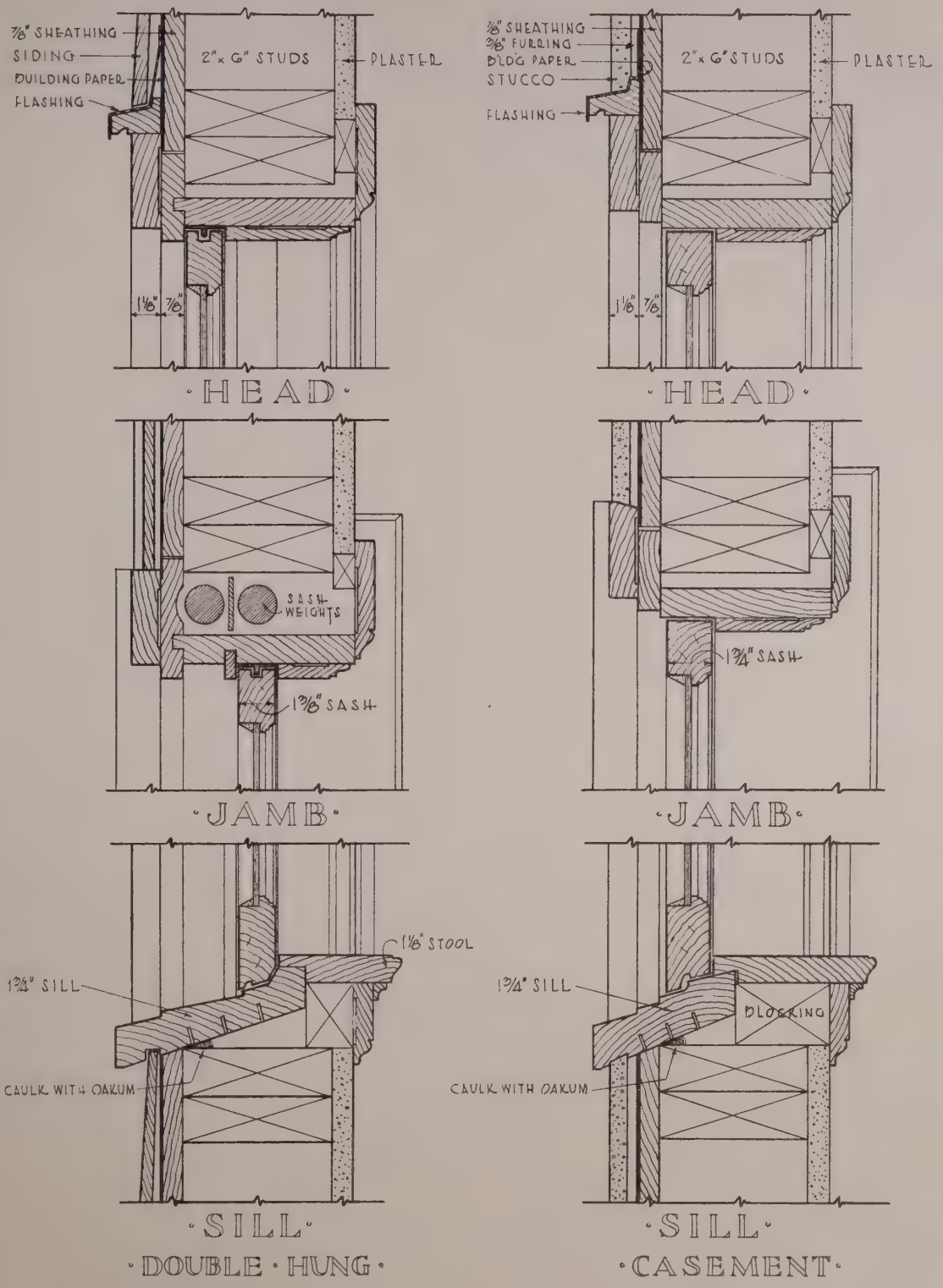
*One end of the dining-room, with its black-glass-bordered mirror surrounded by green scagliola, with curtains of jade-green velvet*

DESIGNED BY
ROBERT W. SYMONDS AND
ROBERT LUTYENS

# Interiors of a London House

*Back drawing-room, the shape of which resulted somewhat from the fact that the work is an alteration. The semi-circular coves above the book shelves are of silver-leaf lacquered, reflecting concealed lighting. The windows also have concealed lighting diffused down from the curtain heads. Wall surfaces here too are slightly rough, painted an elusive peach, modified by parchment brown. Curtains are of apricot silk poplin. Furniture is upholstered in champagne Roman satin*

*In this bedroom the plaster walls have a deep cream parchment finish; the woodwork is also cream; and the curtains blue. The ceiling is sky blue irregularly clouded with gray. Here again the lighting is reflected from the semi-circular niches above the glass-panelled cupboards*




# CASEMENT AND D.H. WINDOW IN FRAME WALL

A Series of Working Drawings by Jack G. Stewart

SCALE: 0 1" 2" 3" 4" 5" 6"

PLATE No. 32

# BOOK REVIEWS

AN INTRODUCTION TO ARCHITECTURAL DRAWING. By Wooster Bard Field. 103 pages, 9 by 12 inches. Illustrations from drawings, plans and details. New York: 1932: McGraw-Hill Book Co., Inc. $2.50.

The author, who is Associate Professor of Engineering Drawing in the Ohio State University, attempts to explain to the beginning student the various kinds of graphic representation involved in architectural practice, with the idea of aiding his decision as to whether or not he should study architecture.

AN ARCHITECT MUSES. By William Roger Greeley. 98 pages, 5½ by 8 inches. Boston: 1932: The Beacon Press, Inc. $1.60.

Concerning architecture as a necessity, as a profession, as a commodity, a business, a pastime, as the vestal of the crafts, as an inspiration, a personality, and as a prophecy. A good book to present to a client who has no clear knowledge of what architecture is and does.

ACOUSTICS AND ARCHITECTURE. By Paul E. Sabine. 327 pages, 6 by 9 inches. Illustrations from photographs and drawings. New York: 1932: McGraw-Hill Book Co. $3.50.

Mr. Sabine's book is perhaps primarily a textbook for students. Secondarily, but by no loss of effectiveness in presentation, it clears up for the architect and engineer the results of recent research and laboratory experiments dealing with the control of sound in buildings. The necessary mathematical treatment has been held within the compass of two years of college training in mathematics.

AIR CONDITIONING FOR COMFORT. By Samuel R. Lewis. 244 pages, 5¼ by 8¼ inches. Illustrations from diagrams. Chicago: 1932: Engineering Publications, Inc. $2.

The book describes the fundamentals which have to do with heating and cooling for human comfort, gives the practical formulas for computations, and stresses, throughout, the close connection between heating and cooling systems.

PLANNING AND BUILDING THE CITY OF WASHINGTON. Edited by Frederick Haynes Newell. Foreword by Allen B. McDaniel. 264 pages, 5½ by 8 inches. Illustrations from photographs and drawings. Washington, D. C.: 1932: Ransdell, Inc., under the auspices of the Washington Society of Engineers. Retail, $2; founders edition, $3.

The history of Washington in its making is so full of good and bad efforts, wisdom and forgetfulness, progress and retrogression that it has never been completely told—nor perhaps ever will be. Here is a serious effort, however, through the Washington Society of Engineers, with the co-operation of the Washington Chapter, A. I. A., to put the record into available form. Alexander B. Trowbridge contributes the chapter on the "Federal Buildings and the Triangle Plan"; Colonel Grant on "Parks and Monuments."

THE DECORATION OF THE TOMB OF PER-NEB. The Technique and the Color Conventions. By Caroline Ransom Williams. 81 pages, 9½ by 12½ inches, 20 plates. Illustrations from photographs and drawings in black and white and color. New York: 1932: The Metropolitan Museum of Art. $8.

The Tomb of Per-Nēb is one of Edward S. Harkness's gifts to The Metropolitan Museum of Art. It was discovered at Sakkāreh, Egypt, in 1907, and first opened to the New York public in February, 1916. The author's researches deal with the wall sculptures and wall painting associated with the close of the Fifth Dynasty in the twenty-seventh century before Christ.

TESTS OF CELLULAR SHEET-STEEL FLOORING. By J. M. Frankland and H. L. Whittemore. 31 pages, 6 by 9 inches. Illustrations from photographs and diagrams. Research Paper No. 463. Pamphlet binding. Washington: 1932: U. S. Department of Commerce. 10 cents.

A METHOD OF PROCEDURE AND CHECKING SCHEDULE FOR PLANNING SCHOOL BUILDINGS AND THEIR EQUIPMENT. By John J. Donovan. Foreword by Samuel A. Challman. 361 pages, 7¾ by 10 inches. Illustrations from photographs and plans. Milwaukee: 1932: The Bruce Publishing Co. $6.50.

The author, who is an architect, shares with his fellow practitioners a system which he has developed in an extensive practice. The work is a check list developed in great detail covering all elements of schoolhouse work.

HOME ARCHITECTURE. A Textbook for Schools and Colleges. A Manual for the Home Builder and Home Owner. By Rexford Newcomb and William A. Foster. 336 pages, 6 by 9 inches. Illustrations from photographs and drawings. New York: 1932: John Wiley & Sons, Inc. $3.25.

The subtitle is almost sufficient description. The authors' plan of showing typical accessories by means of the manufacturers' catalogue illustrations would suggest an early need for revision, with the rapid march of progress.

# The Editor's Diary

*Tuesday, November 1.*—Dropped in at The Producers' Council meeting at The Architectural League and listened to a stimulating letter from Max Dunning, but had to leave shortly thereafter to judge an archæological problem at the Beaux-Arts Institute of Design, calling for the presentation of a Spanish *reja*. In spite of the fact that the programme called specifically for large-scale details, many of the students had apparently gained no real consciousness of what wrought iron is. Unquestionably it is one of the hardest things to build up in a designer's mind—a real feeling for the material in which he is expressing his design. Of course, the later Spanish Renaissance work in wrought iron did get rather far away from the forge in its simulation of finely cut mouldings, depressed panels, and intricate foliage, none of which seems to come very directly from the anvil and hammer.

*Wednesday, November 2.*—E. L. Norberg, of San Francisco, joined the architectural editors at luncheon today to present the details of an ambitious scheme on the part of the Northern California Chapter's Standards Committee to publish a sort of bibliography, index, and guide which would correlate the technical information of the day so as to make it more readily available to the architect when he needs it.

Buckminster Fuller was also with us to tell us of the progress his magazine, *Shelter*, is making in its effort to achieve what has usually been considered impossible—a journal supported primarily by its subscribers, rather than largely by its advertising revenue. Naturally there was considerable clash between Mr. Norberg's plans to improve and further the existing system, and Fuller, whose conviction is that the whole system has proven its unsuitability to this time and people.

*Thursday, November 3.*—Chester H. Rowell, speaking before the architects of California at the recent Del Monte Convention, said a number of good things, one of which was: "Even the fashions of 'unfashion' are just as standardized as the old academic standards. My impression of modern art is that the standard is, no matter how well you can draw, you mustn't!"

*Friday, November 4.*—From all accounts, Boston has been doing a splendid job in putting unemployed architects and engineers at the job of making a really comprehensive survey of their city in connection with its need of housing. They have assigned a dozen different sections of the city to a dozen architects charged with making preliminary surveys, preparing the necessary charts, and compiling the desired statistics as to occupation and other facts concerning these districts. Taken together, these will constitute the first complete architectural survey of the city, and will be of immense importance to the community in future problems of community planning, better housing, slum clearance, transportation and the like.

*Monday, November 7.*—Hobart Upjohn, Edward S. Hewitt, and I lunched with Forest Grant at the University Club, discussing with the last named his efforts, as Director of Art in the public schools, to inculcate the students with something of art appreciation. We were encouraged in that last season, through talks given by various architects to students and teachers, we had reached a total of twelve thousand students. This year's programme provides for a continuation of the work with the emphasis upon talks to the teachers rather than to large bodies of students, allowing the teachers themselves to pass on the information in ways that are better suited to the pupil's understanding.

*Tuesday, November 8.*—I am glad to see that Joseph, Ralph and Herbert Pulitzer are going to restore the memorial to their father which stands in the Plaza at Fifth Avenue and 59th Street. Apparently the limestone which was used to carry out Thomas Hastings's design was taken from an upper stratum of the quarry, and proved to be much too soft. The Pulitzer Memorial Fountain has been a very distressing eye-sore for several years, and it is good news to learn that the sculptural part of the fountain, which was designed by Karl Bitter and, after his death, completed by Isidore Konti, will again be made good to look upon.

*Wednesday, November 9.*—I see that the architects of Indiana are conducting a weekly building page in the *Indianapolis News*. The attempts to pass on to the public some dependable information regarding architectural matters seem to be somewhat spasmodic, but slowly growing in number. Indianapolis comes on the stage as New York in its *Herald Tribune* page goes off. Personally I think the latter died because of too obvious special pleading on the part of the architect contributors.

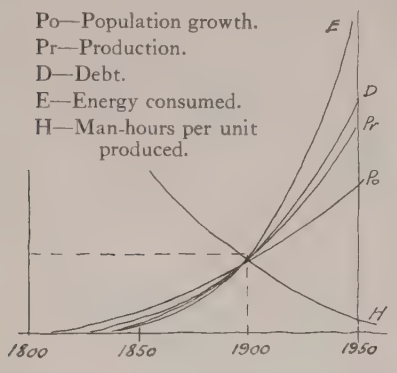
*Thursday, November 10.*—The Steel Joist Institute has just published the results of tests made at Columbia University to show relative fire endurance of a long-span, open-web, steel-joist floor protected with a ceiling of metal lath and plaster.

*Friday, November 11.*—A large number of Architectural League members gathered at luncheon in the clubhouse today to discuss ways and means of carrying the organization through some of the difficulties of the present emergency. Among the many emergency measures proposed there rang an unbroken note of confidence in the things for which The League stands, and which it so ably furthers. Occasions of this kind are always the more enjoyable because of the presence of many of the elder statesmen, such as Cass Gilbert, Benjamin Morris, and many others in whose affections and concern The League continues to hold a place that is unique.

*Sunday, November 13.*—Into a sleeper for Pittsburgh and found Robert D. Kohn, Clarence Stein, Henry Wright, Chester Aldrich, and Frederick Ackerman in the smoking compartment—all bound for the National Conference on City Planning. Ackerman has been working on some research, as usual, and has uncovered a fact which I have not heard mentioned before, namely, that technological progress is rapidly decreasing the amount of space required for industrial purposes in our cities. He cited one manufacturing concern which has not only decreased the number of employees by half within the last five years, but has also decreased the amount of space it requires one half. Coupling this fact up with the flattening out of our population-increase curve, it becomes more and more evident that our cities are not likely to need expansion about the perimeter as much as they do more careful planning and zoning in the interior.

*Monday, November 14.*—The Twenty-fourth National Conference on City Planning was opened at the Hotel Schenley with Charles F. Lewis presiding, director of the Buhl Foundation, Pittsburgh. Messrs. Wright, Kohn, and Ackerman spoke in the morning, pointing out the possibilities of the planner in large-scale housing, and the progress, or lack of it, that is being made in our slow efforts to profit by the R. F. C. credit. Ackerman rather stunned the Conference with some graphs for the period from 1800 to 1950, showing the following curves: population, which has increased with the square of the time; production, which has increased with the third power of the time; debt, which has increased with the fourth power of the time; energy consumed, which has in-

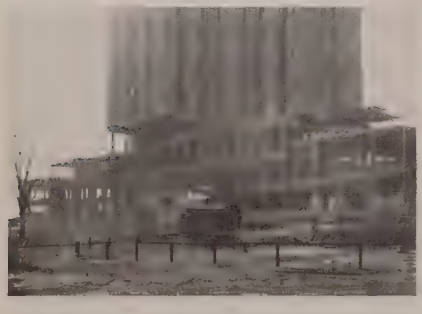
creased with the eighth power of the time; and, finally, the man-hours per unit produced, which has decreased with the fourth power of the time. Ackerman




had nothing to plead, nothing to argue, merely laying before us these startling facts, some of the significance of which it would seem we should have long ago noted and by them set our course.

The Conference proceeded through a luncheon, an afternoon session, and an evening session, the interesting details of which are far too many and varied to be set down in these short notes.

*Tuesday, November 15.*—Between the breakfast round-table on zoning and the beginning of the morning session, I wandered over to see "The Learning Tower of Pizaburgh," Charles Klauder's dominant for the University of Pittsburgh group. It seems particularly unfortunate, in view of the beauty of this



tower, that the money for completing it has apparently ceased its flow temporarily, so that most of the base is, and perhaps will for some time remain, merely a group of bare steel columns.

Nearby is the new building for Mellon Institute, a classic pile of limestone almost entirely surrounded by huge monolithic columns; these might conceivably shelter an art museum or a sub-treasury, but surely not, without an agile imagination, a laboratory for industrial research. There are almost no windows behind the columns, but I understand that the centre of the block is an open court, and many of the laboratory activities are two or three levels under ground. I can hardly believe that Janssen & Cocken, the architects, would

have expressed in this particular monumental form a laboratory for research, unless perhaps Mr. Mellon, during his residence in Washington, became so impressed with the dignity and importance of the classic column that he felt it would be indispensable.

After another profitable session, the members of the Conference were taken out to see Chatham Village, that notable work in group housing carried out by the Buhl Foundation from the designs of Ingham & Boyd, architects, with Clarence S. Stein and Henry Wright consulting. I was interested to find that the houses are built of brick veneer construction, the architects believing that a brick veneer backed by asphalt-impregnated felt on a wood frame, with the plaster on a backed metal lath inside, would produce a wall tighter against moisture and air penetration than eight inches of brickwork. The houses, which are built in groups, having two to six in each, sometimes with an integral garage, others with a garage in a nearby compound, rent for from fifty-four to seventy-nine dollars a month. In some cases the dining-room is separate; in others, an end of the living-room is used for the dining-table; and still others, a dinette between living-room and kitchen. The plans are extremely compact, the buildings well executed, and they are finished with an unusual provision against the necessity for more than a minimum of maintenance costs.

After the evening banquet I had to hurry back to New York, with the more regret in that on the following day some of the Conference members were journeying to Cleveland to look over the new experimental steel house at Solon.

*Thursday, November 17.*—To a luncheon meeting of the New York Chapter, A. I. A., at which President Ernest Russell greeted the members.

With Chester Aldrich back to his office to see what his firm is doing in an unusual architectural activity—making doll houses for Macy's store to sell. The work is being done by some of the firm's draftsmen who have been recalled from unemployment for that purpose.

*Saturday, November 19.*—Sydney E. Martin in from Philadelphia, telling me of the great work that has recently been finished in certain activities of the Philadelphia Chapter. As part of the plan to provide work for the unemployed draftsmen, the Chapter formed a committee to survey what is known as the Old City—an area which lies between the Delaware River on the east, Ninth Street on the west, Spring Garden Street on the north, and Washington Avenue on the south. Various architects were made responsible for certain parts of this area, their duties being to seek out any work still existing from the eighteenth century and early nineteenth, measure it, and by drawings and photographs put it into a permament record. It is gratifying to find that there are one or two whole blocks, with narrow streets, on both sides of which these early brick houses, huddled closely together, still stand. What a marvellous opportunity for Philadelphia to reclaim this old city, much of which is coming under the blight of deterioration and desertion!

*Tuesday, November 22.*—I am sorry to see that the government of Anhalt has closed Gropius' Bauhaus. It was an instructive experiment. The National Socialists have not only closed the Bauhaus, but have voted to pull down the building, which destruction, however, is postponed for lack of funds. The history of the Bauhaus, which was founded in 1920, in Weimar, is interrupted by this decree. The citizens of Weimar were unsympathetic with the experiment of Gropius and his students, regarding them as a profanation of their classic traditions. In 1925, the Bauhaus left Goethe's city, and the government of Anhalt and the town of Dessau placed a new site at its disposal. (Milton Lowenstein contributed an article on the Bauhaus in ARCHITECTURE for July, 1929.) After Gropius conferred the directorship upon the architect, Hannes Meyer, the institution became involved in political wrangles. Mies van der Rohe became the new director, and now I hear that Berlin is offering the Bauhaus a new home.

*Saturday, November 26.*—I'm wondering whether there isn't the beginning of a rather spirited discussion in the fact that students in the Department of Architecture at Yale participated in a competition for a new chapel in Park Cemetery, Bridgeport. The winning design is the work of Charles M. Brooks, Jr., a graduate student. Some one will be rising up to say that bread is being taken from the practitioner's mouth not only by the Small House Service Bureau, but now also by the educational institutions.

# CONTACTS

DEVOTED TO A BETTER UNDERSTANDING OF THE BUSINESS SIDE OF ARCHITECTURE AND ITS RELATION TO THE INDUSTRIES


# The Minimum House


*By Ernest M. Fisher*

Professor of Real Estate, University of Michigan


THE question of determining what to build must be answered in the light of what families can afford to pay for housing facilities. This principle applies with double force to the question of the type of structure which should be erected to replace the unsatisfactory houses in slum, congested, and blighted areas. But as a matter of fact, in actual practice the question of what to build is approached from an almost opposite point of view, adopting certain specifications covering facilities, layout, and equipment, regardless of the influence of these specifications upon cost. The first step in any programme should be the determination of the amount which families are willing and accustomed to pay for housing. Within the limitations set by the answer to this inquiry, the effort should be made to provide as many facilities, conveniences, and luxuries as possible.

In most cases it will probably be found that only the bare minimum of facilities can be provided within the limitations of customary rentals. In the lower-income groups, family incomes probably do not average more than $1500 to $1800 annually. Their rents should not exceed $25 to $35 a month. For this modest return, only bare facilities, the minimum house, can be provided.

Living, as the majority of these families are, in houses that fail to provide even the essentials of health, safety, and some degree of privacy, they are not demanding tile bathrooms, electric refrigeration, and the latest frills and fancies.

Specifically, a minimum house would provide running water, with private toilet and sink in every family unit. Some sort of bathing facilities should also be provided, but it is very questionable whether installation of a bathtub would be found essential. While hot water is a convenience in domestic operations, it is by no means essential to healthful existence provided arrangements are at hand for the heating of a sufficient quantity of water in case of need. Likewise, the provision of central heating facilities is a great convenience, but is by no means essential to healthful and comfortable existence. A combination heating stove and kitchen range is widely used in England and some other European countries and is accepted as standard equipment. Electricity as a lighting device has become essential, but the appliances which go with electricity are still for the most part conveniences if not luxuries.

It will be at once objected that the provision of the minimum house would be an absurd and disastrous experiment because the house when completed would be obsolete. This argument is based upon a false premise. Instead of being an argument against the minimum house it is one of the strongest arguments that could be presented for it. The rapidity with which obsolescence occurs in any commodity is in direct proportion to the degree of luxury which it embodies. Those whose income makes their budget of expenditures rigid necessarily pay little attention to fashion. The minimum house would offer, therefore, the essentials of housing to the lower-income groups, as long as it stood. A proper policy of maintenance and repairs would for a great many decades defeat depreciation. The capital invested in a minimum house therefore has the capacity of producing an income for a much longer period of time than that which is invested in the house that provides more by way of luxury. Instead of a life span of thirty years, it would probably have one of between seventy-five and one hundred.

It would be absurd to expect that the minimum house would be produced by speculative capital seeking large returns. When it is provided it must be produced by capital seeking permanent investment at a fair rate of return. Direct operation will also eliminate the speculative profits which are secured by speculative capital building for a sales market in the hope of a quick turnover. It must be recognized that the provision of housing facilities, especially for the lower-income groups, is a capitalistic enterprise in which the capital investment is permanent.

This plea for the minimum house must be taken not as a pessimistic statement but as originating in the desire for a frank facing of facts. There is no magic by which a standard which can be maintained by income can be created, and certainly there is nothing to be gained by ignoring the direct relationship between income levels and housing standards. Income levels for the majority of families living in congested areas of our large cities are not sufficiently high to enable these families to command those conveniences and luxuries which are provided in all the new construction that is taking place. New construction should be planned definitely to meet the needs of these groups.

## Comparative Costs

AN unusually comprehensive table of costs, figured on the cubic-foot basis, will be found on the next page. All rule-of-thumb cost tables must necessarily be taken as general guides rather than as specific figures. Costs vary with the locality, with the season, with the size of the work, with the existing eagerness of contractors for work. The table reproduced on the following page is a compilation of the Detroit Real Estate Board, its figures applicable to Detroit, but, as is somewhat unusual, showing the variations of those figures over a period of sixteen years, and for a wide variety of buildings. Its primary purpose is to serve as a check on appraisals.

## COST PER CUBIC FOOT IN CENTS

(Copyright, 1932 by Detroit Real Estate Board)

| Classification of Buildings | Aug., 1915 | Aug., 1920 | Jan. 1, 1921 | Aug. 1, 1921 | April 1, 1922 | Dec. 1, 1922 | Jan. 1, 1924 | Feb. 1, 1925 | Feb. 1, 1926 | Feb. 1, 1927 | Jan. 1, 1928 | Jan. 1, 1929 | Jan. 1, 1930 | Jan. 1, 1931 | Jan. 1, 1932 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Factories and Warehouses: | | | | | | | | | | | | | | | |
| Fireproof (Under 300,000 cu. ft.) | .14 | .31½ | .23 | .18 | .17 | .21½ | .24 | .23 | .22½ | .23 | .22 | .22 | .22 | .16½ | .15 |
| Fireproof (Over 300,000 cu. ft.). | .12½ | .29 | .21 | .17 | .16 | .19½ | .23 | .22 | .21½ | .22 | .21 | .21 | .21 | .16 | .14½ |
| Mill Construction | .10 | .22½ | .15½ | .12 | .11 | .14 | .16½ | .16 | .16 | .16½ | .15¾ | .15¾ | .15½ | .11½ | .11 |
| Ordinary | .09 | .21 | .15 | .12 | .10½ | .13½ | .15 | .14½ | .14 | .14½ | .14 | .14 | .13½ | .10 | .09½ |
| Frame | .07½ | .17 | .12 | .10 | .08 | .11½ | .13 | .11 | .10½ | .10½ | .10 | .10 | .10 | .07½ | .07 |
| Stores: | | | | | | | | | | | | | | | |
| Fireproof | .23 | .52 | .39 | .31 | .30 | .36 | .41½ | .40 | .39 | .39½ | .38 | .38 | .38½ | .30 | .29½ |
| Ordinary | .16½ | .37½ | 26½ | .21 | .19 | .24½ | .28 | .26½ | .26 | .26½ | .25½ | .25½ | .25 | .20 | .19 |
| Flats (Above Ordinary) | .22 | .48½ | .34 | .27 | .23 | .30½ | .31 | .29 | .28 | .28½ | .27½ | .27½ | .27 | .22 | .21 |
| Ordinary without Basements | ..... | ..... | ..... | .16¾ | .16 | .18½ | .21 | .19 | .18 | .18 | .17½ | .17½ | .17 | .14¼ | .14 |
| Churches and Theaters: | | | | | | | | | | | | | | | |
| Fireproof | .18 | .40½ | .35 | .28 | .27 | .32½ | .37½ | .36 | .35¼ | .36 | .34¾ | .34¾ | .35 | .27 | .26 |
| Ordinary | .15½ | .35 | .24½ | .19 | .18 | .22 | .28½ | .27½ | .27 | .27½ | .26½ | .26½ | .26 | .20½ | .19½ |
| Office Buildings: | | | | | | | | | | | | | | | |
| Fireproof | .30½ | .68½ | .54½ | .44 | .35 | .51 | .54½ | .52 | .51 | .51½ | .49¾ | .49¾ | .50 | .39 | .37½ |
| Ordinary | .22 | .48½ | .34 | .27 | .25 | .30½ | .35 | .33½ | .32¾ | .33¼ | .32 | 32 | .32 | .25 | .24 |
| Hotels: | | | | | | | | | | | | | | | |
| Fireproof | .33½ | .75½ | 58½ | .45 | .37 | .52 | .59½ | .57 | .56 | .57½ | .55½ | .55½ | .56 | .42¾ | .42 |
| Ordinary | .29½ | .66½ | .46½ | .37 | .26 | .43 | .43 | .34 | .32 | .32½ | .31¼ | .31¼ | .31 | 25½ | .24 |
| Schools: | | | | | | | | | | | | | | | |
| Fireproof | .22 | .48½ | .40½ | 32 | .30 | .37 | .45½ | .43½ | .42 | .43¼ | .40 | .40 | .40 | .32 | .30 |
| Hospitals: | | | | | | | | | | | | | | | |
| Fireproof | .32 | .72 | .54 | .32 | .33 | .37 | .45½ | .43½ | .42 | .43¼ | .45 | .45 | .45 | .32 | .32 |
| All Steel Buildings: | | | | | | | | | | | | | | | |
| Under 20,000 cu. ft. | .12 | .25 | .21 | .17 | .15 | .19½ | .20 | .14 | .13½ | .13½ | .13 | .13 | .13 | .11 | .11 |
| 20,000 to 100,000 cu. ft. | .08 | .18 | .15 | .12 | .10 | .14 | .14½ | .12 | .11 | .11 | .10½ | .10½ | .10½ | .10 | .10 |
| Over 100,000 cu. ft. | .06½ | .14 | .13 | .10 | .08 | .11½ | .11½ | .10 | .09½ | .09½ | .09 | .09 | .09 | .07 | .07 |
| Apartments: | | | | | | | | | | | | | | | |
| Fireproof | .35 | .78 | .54 | .43 | .36 | .50 | .55 | .52½ | .51 | .52 | .50 | .50 | .50 | .39 | .37½ |
| Protected | .29½ | .66½ | 46½ | .37 | .30 | .43 | .48 | .46 | .45½ | .46 | .44¼ | .44¼ | .45 | .34½ | .34 |
| Brick (Ordinary) | .28 | .63 | .43 | .34 | .23½ | .39½ | .34 | .32 | .30 | .30½ | .29½ | .29½ | .29 | .24 | .23 |
| Brick (Veneer) | .24 | .54 | .37 | .30 | .22 | .34½ | .32 | .30 | .29 | .29 | .28 | .28 | .28 | .22½ | .22 |
| Residences: | | | | | | | | | | | | | | | |
| Brick | .30½ | .68½ | .48 | .38 | .33 | .45 | .48 | .46 | .45 | .45½ | .44 | 44 | .44½ | .34½ | .33½ |
| Brick (Veneer and Stucco) | .24 | .54 | .37 | .30 | .24 | .34½ | .34 | .32½ | .32 | .32 | .30¾ | .30¾ | .30½ | .24 | .23 |
| Frame | .21½ | .48½ | .34 | .27 | .19 | .30½ | .30 | .26½ | .25 | .25 | .24 | .24 | .24 | .20 | .19 |
| Frame (Not over 25,000 cu. ft.) | .... | .... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .20 | 20 | .20 | .20 | .15 | .15 |
| Cinder Concrete Block | .... | .... | ..... | ..... | ..... | ..... | .41½ | .39 | .38 | .38 | .36¾ | .36¾ | .37 | .29 | .28 |
| Garages: | | | | | | | | | | | | | | | |
| Fireproof | ..... | .30 | .23 | .18 | .17 | .21 | .24 | .23 | .22½ | .23 | .22¼ | .22¼ | .23 | .17 | .17 |
| Mill Construction | ..... | .20 | .15 | .12 | .11 | .14 | .16 | .15 | .14 | .14½ | .14 | .14 | .13½ | .11 | .11 |
| Ordinary | ..... | .17 | .14 | .11 | .10 | .13 | .15 | .13½ | .12½ | .13 | .13 | .13 | .13 | .10 | .10 |
| Frame | ..... | .14 | .12 | .09 | .08 | .10½ | .12 | .10 | .09½ | .09½ | .09 | .09 | .09 | .08 | .07 |
| Sheds Without Heat: | | | | | | | | | | | | | | | |
| Enclosed Without Floor (Frame) | | | | | | | | | | | | | | .04¾ | 04½ |
| Enclosed (Frame) | | | | | | | | | | | | | | .06 | .06 |
| Enclosed (Ordinary Construction) | | | | | | | | | | | | | | .09½ | .09¼ |
| Enclosed Without Floor (Ordinary Construction) | | | | | | | | | | | | | | .09¼ | .09 |
| Enclosed (All Steel) | | | | | | | | | | | | | | .04½ | .04½ |
| Enclosed Without Floor (All Steel) | | | | | | | | | | | | | | .03½ | .03½ |
| Open Shelter (Frame Construction) | | | | | | | | | | | | | | .03 | .03 |

1926
DORMER WINDOWS
SHUTTERS AND BLINDS

1927
ENGLISH PANELLING
GEORGIAN STAIRWAYS
STONE MASONRY TEXTURES
ENGLISH CHIMNEYS
FANLIGHTS AND OVERDOORS
TEXTURES OF BRICKWORK
IRON RAILINGS
DOOR HARDWARE
PALLADIAN MOTIVES
GABLE ENDS
COLONIAL TOP-RAILINGS
CIRCULAR AND OVAL WINDOWS

1928
BUILT-IN BOOKCASES
CHIMNEY TOPS
DOOR HOODS
BAY WINDOWS
CUPOLAS
GARDEN GATES
STAIR ENDS
BALCONIES
GARDEN WALLS
ARCADES
PLASTER CEILINGS
CORNICES OF WOOD

1929
DOORWAY LIGHTING
ENGLISH FIREPLACES
GATE-POST TOPS
GARDEN STEPS
RAIN LEADER HEADS
GARDEN POOLS
QUOINS
INTERIOR PAVING
BELT COURSES
KEYSTONES
AIDS TO FENESTRATION
BALUSTRADES

1930
SPANDRELS
CHANCEL FURNITURE
BUSINESS BUILDING ENTRANCES
GARDEN SHELTERS
ELEVATOR DOORS
ENTRANCE PORCHES
PATIOS
TREILLAGE
FLAGPOLE HOLDERS
CASEMENT WINDOWS
FENCES OF WOOD
GOTHIC DOORWAYS

1931
BANKING-ROOM CHECK DESKS
SECOND-STORY PORCHES
TOWER CLOCKS
ALTARS
GARAGE DOORS
MAIL-CHUTE BOXES
WEATHER-VANES
BANK ENTRANCES
URNS
WINDOW GRILLES
CHINA CUPBOARDS
PARAPETS

1932
RADIATOR ENCLOSURES
INTERIOR CLOCKS
OUTSIDE STAIRWAYS
LEADED GLASS MEDALLIONS
EXTERIOR DOORS OF WOOD
METAL FENCES
WOOD CEILINGS
MARQUISES
WALL SHEATHING
FRENCH STONEWORK
OVER-MANTEL TREATMENTS

THE SEVENTY-FIFTH IN A SERIES OF COLLECTIONS OF PHOTOGRAPHS ILLUSTRATING VARIOUS MINOR ARCHITECTURAL DETAILS

# ARCHITECTURE'S PORTFOLIO OF

# BANK SCREENS

*Subjects of Previous Portfolios Are Listed at Left*

*Forthcoming Portfolios will be devoted to the following subjects: Interior Doors (February), Metal Stair Railings (March), Verandas (April), The Eagle in Sculpture (May), Eaves Returns on Masonry Gables (June), and Exterior Lettering (July). Photographs showing interesting examples under any of these headings will be welcomed by the Editor, though it should be noted that these respective issues are made up about six weeks in advance of publication date.*

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*Louis E. Jallade*

*C. P. H. Gilbert*

*Allen & Collens*

*Albert Kahn, Inc.*

*Benjamin W. Morris*

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*Renwick, Aspinwall & Tucker*

*W. F. Brooks*


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*William E. Lehman*

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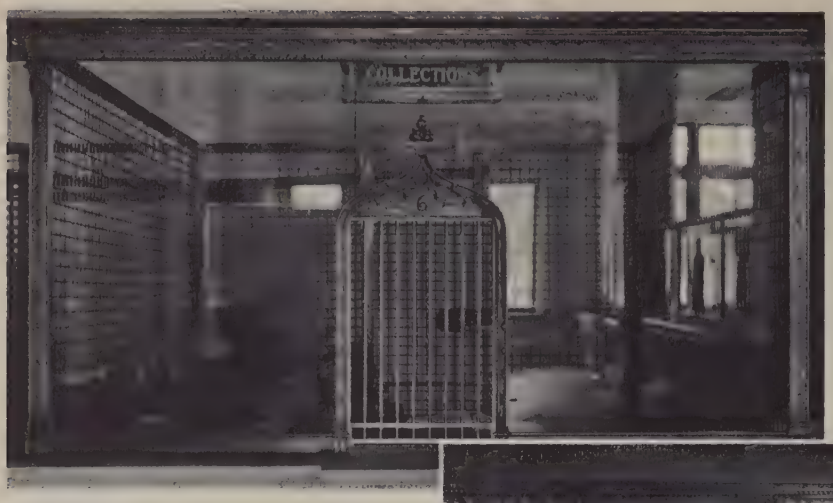
*Smith, Hinchman & Grylls*



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*Albert B. Groves, Inc.*

*J. W. Cook Corporation*

*Detail of the above*


*Detail of the above*


*Albert Kahn, Inc.*

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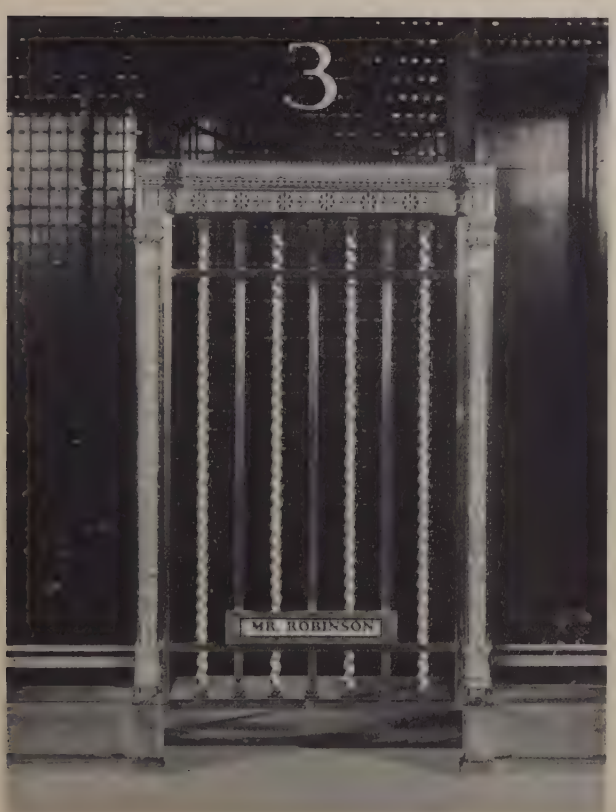


*Detail of the above*

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*York & Sawyer*

*Alfred C. Bossom*

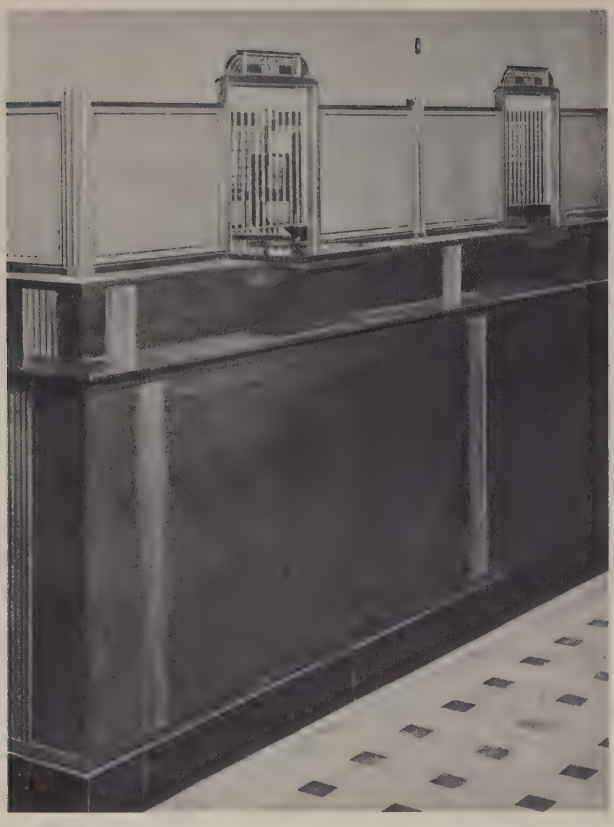
*Paul P. Cret*

*The Mechanics Bank, New Haven, Conn.*

*William E. Lehman*

*York & Sawyer*

*Rye National Bank, Rye, N. Y.*



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*Morgan, Walls & Clements*

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*William Richards*

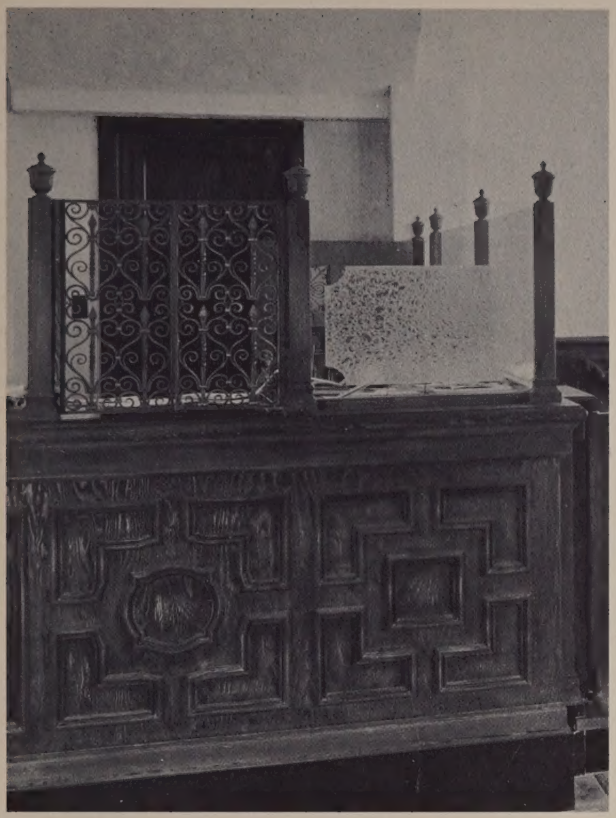
*Morgan, Walls & Clements*

*John Parkinson and Donald B. Parkinson*

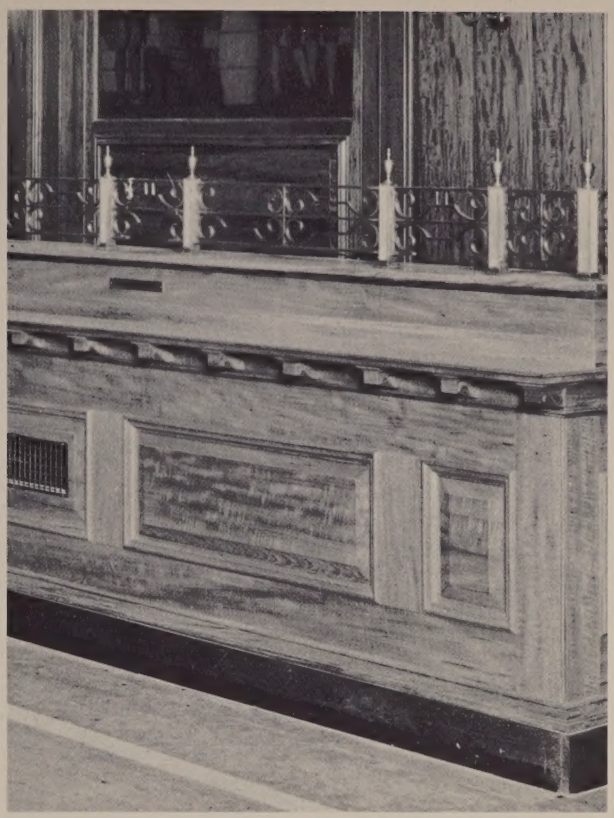
*Walker & Eisen*

*Morgan, Walls & Clements*

*Smith, Hinchman & Grylls*

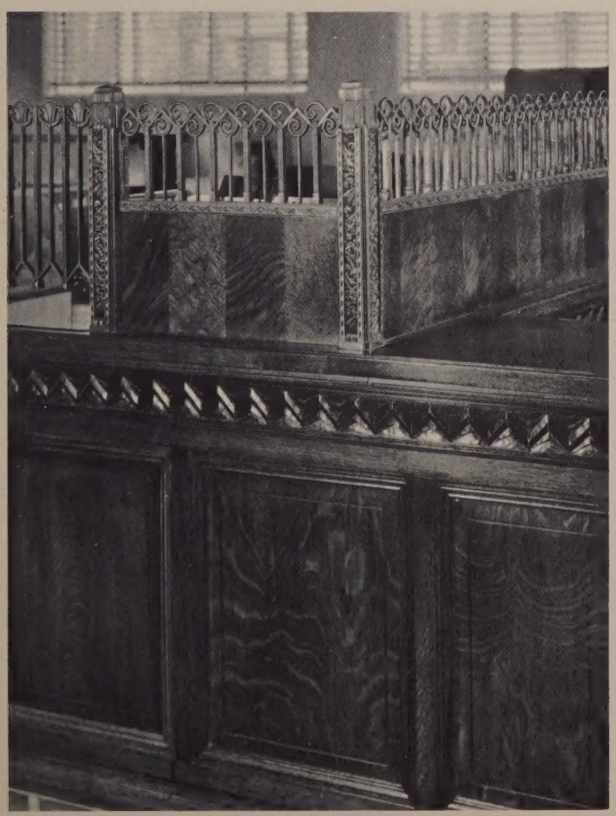


*Virgil Westbrook*

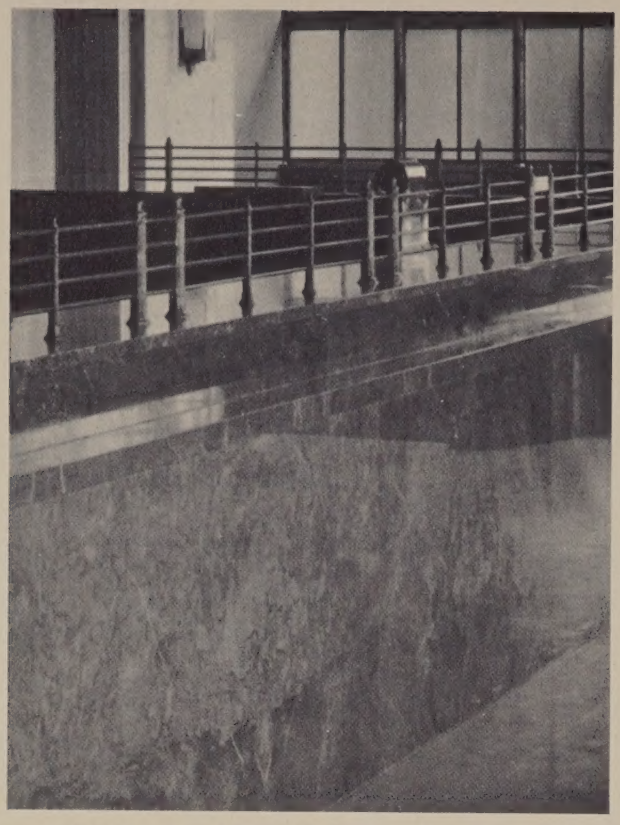


*Howe & Church*

*John Parkinson and Donald B. Parkinson*

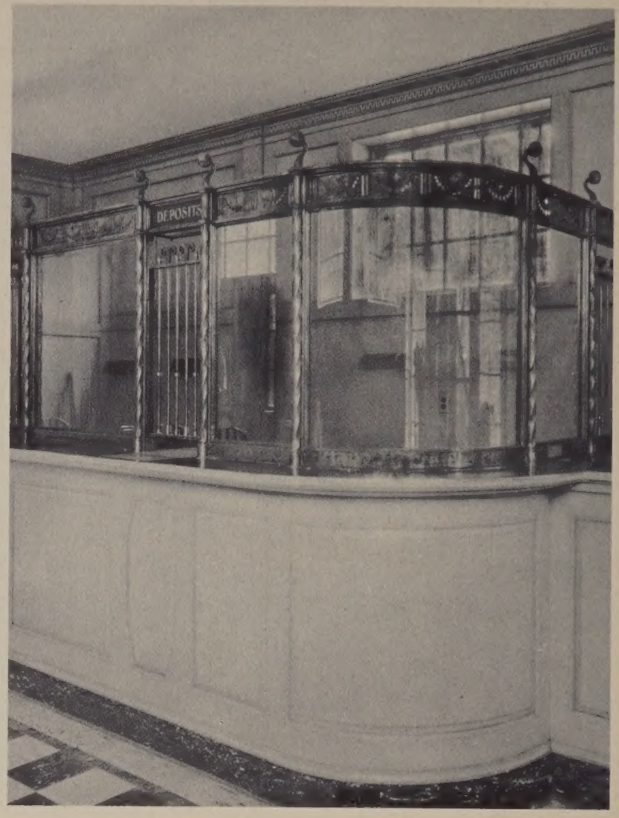


*Alfred F. Priest*



*The State Bank and Trust Company, New York City*

*George F. Pelham*

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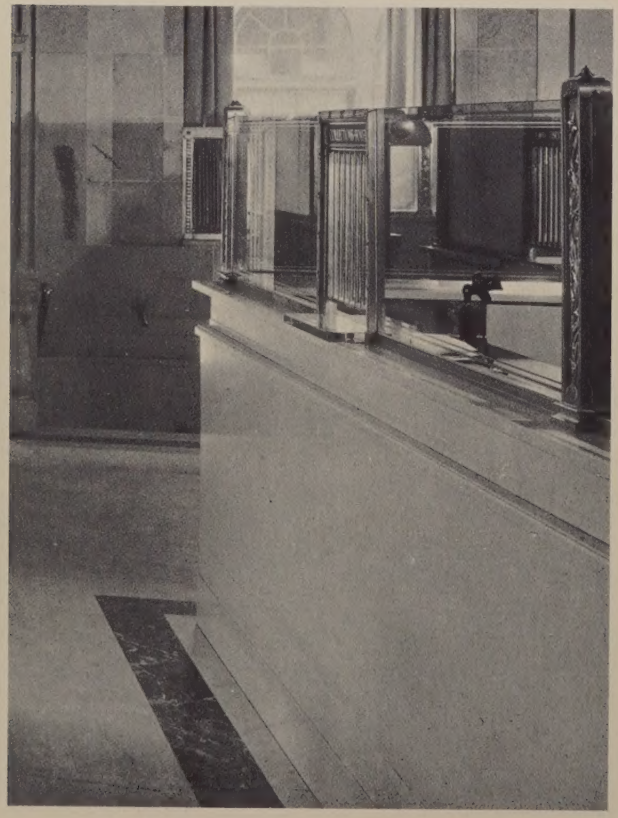
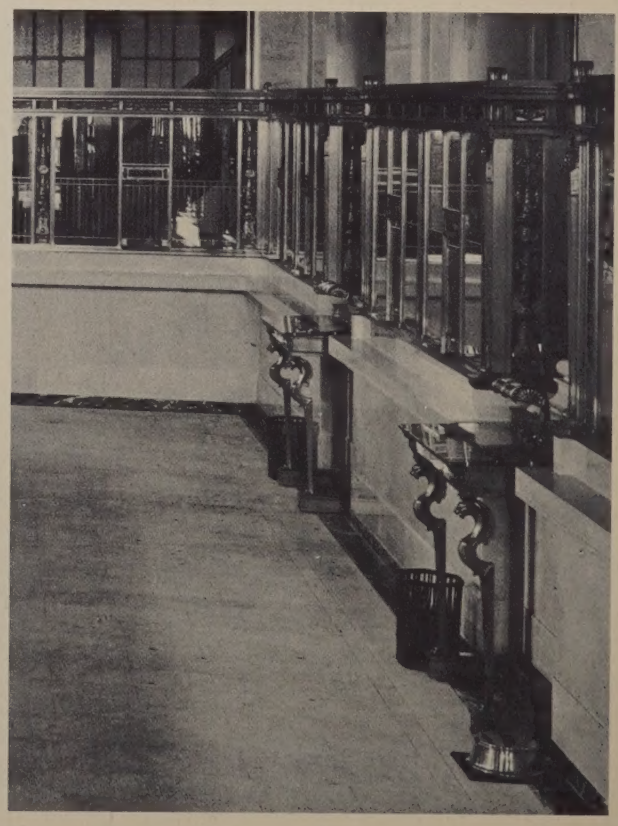
*Montague Flagg*






*WASH SHEDS ON THE RIVER EURE, CHARTRES*

*From the pencil drawing by Carl Loven*